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The Tissue Bank: Present and Future*

By

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The surgeon's views and experiences with stored homografts processed by the Tissue Bank of the Naval Medical School at the National Naval Medical Center, Bethesda, Maryland, are presented. The method of storage is noted as learned from experiences with over 12,000 individual tissue deposits. The clinical accomplishments with stored bone, skin, fascia, dura, and arteries are shown on the basis of their surgical application in a series of approximately 3,000 patients.

THE Tissue Bank Department of the Naval Medical School at the National Naval Medical Center is a clinical research and development unit emphasizing the study of human homografts and their place in the field of tissue transplantation. The administrative organization of the department is shown in Figure 1. The over-all missions are assigned as follows:

a. *Tissue Bank Division.* This division is responsible for the procurement, storage and dispensing of tissues and the technical development and research associated therewith.

b. *Tissue Culture Division.* This division is responsible for investigating methods of determining the viability of the stored homograft; for investigating the clinical potential of viable tissue culture cells and modification of the homograft response to adult living cells through tissue culture methods.

c. *Tissue Chemistry Division.* This division is responsible for evaluating and improving the clinical standards of the homograft through physical and biochemical methods and the technical development and research associated therewith, and with general tissue banking procedures.

d. *Administrative Division.* This division is responsible for furnishing general administrative support within the department and accomplishing all administrative procedures connected with the Tissue Graft Registry.

e. *Tissue Bank School.* This division is responsible for the training of students in the didactic and practical aspects of tissue banking.

It should be emphasized that the tissue autograft is the ideal transplant. The point of contention seems to be whether the autograft is so far superior to the admittedly inferior homograft that there is no place left in our surgical armamentarium for tissue homografts. A partial answer, we feel, lies in the Tissue Bank accomplishment pattern.

The information and observations obtained from evaluating homografts which were procured from over 300 sterile post mortem tissue excisions, processing over 12,000 individual tissue deposits and using such deposits in the surgical treatment of over 3,000 patients, provide the basis for this paper.

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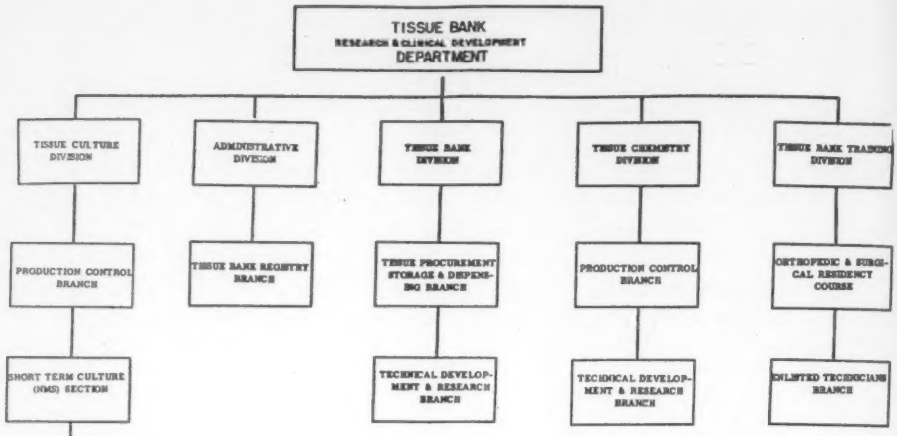

FIG. 1. Administrative organization of the Tissue Bank Department, U. S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland.

The development of the homograft problem by the biologist has resulted in some reproducible observations and a terminology which must be shared with the surgeon. In order that due regard will be given to the need for clinical expression and in the hope that biological terminology will not suffer unduly, the following definitions are presented from the physician's viewpoint.

Autograft—Tissue taken from one operative site in the same patient; e.g., a tibial graft as an onlay to a fractured radius.

Homograft—Tissue taken from one operative site in one patient and grafted to an operative site in another patient; e.g., tibial cortical bone taken from a cadaver and used as onlay graft for a fractured radius.

Isograft—Tissue graft removed from inbred strains (animals) (20 generations).

Syngenesiograft—Tissue grafts removed from closely related individuals, e.g., tibial bone from a mother used as an onlay graft to the fractured radius of her child.

THE BIOLOGY OF THE HOMOGRAFT

Observations at both the animal and clinical levels have indicated that homograft rejection following the homograft response is frequently associated with cellular viability. Perhaps the rejection phenomenon indicates a degree of immunological competence not acceptable in clinical graft performances. Subcellular particles, namely DNA and RNA, have been shown to possess an ability to evoke a skin "second set" response.[1,2] With the usual clinical storage methods currently available, it seems doubtful that there can be any significant difference between those grafts maintaining viability and those maintaining the immunizing capacity of the subcellular particules. In our laboratory freeze-dried skin does not retain its ability to elicit the "second set" response in the laboratory animal. The storage of tissues in nutrient media at 4° C. permits not only cellular viability but the retention of the tissue's capacity to elicit the "second set" response.

In applying these concepts clinically, one might logically expect that, (1) the lower the number of viable cells per volume of graft matrix, the greater the chance of the graft's clinical success, and (2) the greater the number of viable cells in a graft surviving surgical transplantation, the less likeli-

hood there would be of the graft's clinical success. Both are true in clinical practice. The utilization of a homograft that remains highly populated with viable cells after transplantation is a potential surgical disadvantage. Human homografts which are characterized by a sparsely cell-populated matrix and which function with a reasonable degree of success clinically are bone, cartilage, dura, fascia, cornea and artery.

The manner of function of the nonviable, albeit biologically active, homograft is expressed in the concept "the biodynamic capacity of the graft." The concept includes:

1. *Biologically Tolerable.* The graft is initially and continually biologically tolerated by the host.

2. *Biologically Mechanically Competent.* It satisfactorily and progressively accepts the mechanical demands of the operative site, whether it be the mechanical demands for continued transport of aortic blood or the mechanical demands of a cortical bone graft to maintain the alignment of a fractured tibia.

3. *Biologically a Template.* It is a template and also dynamic in the sense that it evokes and participates in a cellular response at the operative site, associating itself with the functional reduplication of the graft by living host tissue.

4. *Biologically Completely Replaced.* It evokes a gradual and progressive replacement of a functional form at the cellular and matrix level without compromising either its ultimate biological acceptance or biological competence.

Tissue Storage

Freezing Method. From the ideal standpoint, tissue freezing should achieve complete immobility of molecular components. These same components should, upon thawing, assume their previous functioning level of metabolic activity. Unfortunately, we have been unable to achieve this ideal in practice. Some observations which may account for this physical limitation are:

1. The concentration of electrolytes as ice crystal formation increases to the point that is lethal to cells and potentially destructive to matrix.

2. The effect of thermal shock on various tissues.

Freeze Drying Method. Freeze drying is essentially the removal of tissue ice crystals by sublimation in a vacuum. Bone was the first tissue freeze-dried for clinical use following the processing method developed by Flosdorf and Hyatt[3] and applied surgically by Kreuz et al.[4] As currently accomplished, the method has been substantially modified from the original description.[5]

The tissues to be freeze-dried are usually aseptically procured. Bone is frozen by permitting it to freeze slowly from room temperature to the deepfreeze temperature of −60° C. (Figure 2). Equilibration to −60° C. is accomplished in approximately 5½ hours for cortical bone. The freeze-dryer has its temperature lowered to −45° C. in the chambered unit. The bone is then loaded on to the top shelf, which is the drying shelf by virtue of the pathway of the vapor, progressing from the top shelf to the two colder lower shelves. The two-stage mechanical pump usually achieves an operating vacuum

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Fig. 2. Bone is frozen to deepfreeze temperature of −60°C.

of 5-10 micra after 30 minutes of operation. Sublimation of tissue ice crystals begins when the vacuum reaches approximately 100 micra of mercury. The temperature of the individually controlled upper shelf is permitted to rise gradually to 0° C. in 24 hours and to 25° C., or roughly room temperature, on the ninth day in order to supply the latent heat of sublimation. This stepwise elevation of temperature increases the efficiency of the freeze-drying cycle without any apparent significant alteration of protein and enzyme structures. The freeze-drying cycle lasts 14 days for bone and 3 days for the relatively "soft" tissues such as skin, fascia, dura, cartilage and artery. To terminate the freeze-drying cycle, the chamber is permitted to equilibrate to room atmosphere and temperature by means of room air passed through a Selas filter. The individual deposits are subjected to a secondary vacuum and hand-stoppered with a rubber seal (Figure 3). The rubber seal is coated with a hot vacuum-resistant wax. Vacuum integrity is verified by the ionizing ability of a high frequency spark as indicated by a blue glow. The vacuum per unit is at least the magnitude of 5000 micra. The "deposit" is now "banked" at room temperature (Figure 4). The development and evaluation of better methods of tissue homograft storage constitutes a maximum effort of the department.

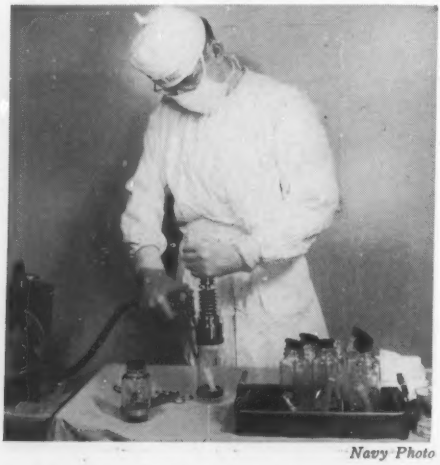

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FIG. 3. The individual deposits are subjected to a secondary vacuum and hand-stoppered with a rubber seal.

Navy Photo

FIG. 4. The "deposit" is "banked" at room temperature.

The storage of freeze-dried products at room temperature is a most practical advantage. Such a method also lends itself to centralization and quality control of procurement, processing, storage, dispensing and shipment of tissues. Another advantage is that the reconstituted graft has the same shape and volume as it had before freeze-drying. In addition, the graft regains the biologically important mechanical properties. This is best exemplified with freeze-dried arteries.

Quality control of the production of freeze-dried tissues has been largely confined in our laboratories to residual moisture determinations. The amount of "free" moisture remaining is a rough index of the keeping quality of freeze-dried products. It is our opinion that three to four percent residual moisture is an acceptable level. Bone stored for six years with a level of three to four percent residual moisture has been utilized surgically with no evidence of unusual host response in short-term observations on human patients. It is extremely difficult to de-

Standard Form 522B
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CLINICAL RECORD | **AUTHORIZATION FOR TISSUE DONATION**

In the event authorization for tissue donation is obtained by letter, telegram, or mechanically recorded telephone call, paragraphs 1 and 2 shall be completed by hospital authorities and the letter, telegram, or memorandum confirming telephone call of authorization attached to this form for permanent file.

NAME AND LOCATION OF HOSPITAL	DATE
1. U. S. Naval Medical School, NNMC, Bethesda 14, Maryland	13 April 1959

2. You are hereby authorized to remove the following-named tissue from the remains of

John Joseph DOE (Name of deceased) for donation to the Tissue Bank of The Naval Medical School, National Naval Medical Center, Bethesda 14, Maryland (Name of hospital)

Artery, Bone, Dura, Eyes, Skin, Cartilage and Fascia
(Specify: tissue, eg. bone, artery, cartilage, skin, fascia, dura, nerve, tendon, etc.)

Authority is also granted to use the tissue in grafts upon living persons, or to dispose of the tissue in a suitable manner.

Signature of witness /s/ Henry Jones
Henry Jones

Address U. S. Naval Hospital
Bethesda 14, Maryland

Signature /s/ Mrs. Mary Jane Doe
Mrs. Mary Jane Doe
(Person authorized to consent)

Address 1234 Main Street
Washington, D. C.

Authority to consent Spouse

Approved: _____
F. P. KREUZ, CAPT MC USN
Commanding Officer
U. S. Naval Hospital
NNMC, Bethesda 14, Maryland

SAMPLE USED AT NAVAL MEDICAL SCHOOL, NATIONAL NAVAL MEDICAL CENTER, BETHESDA, MD.

PATIENT'S IDENTIFICATION (*For typed or written entries give: Name—last, first, middle; grade; date; hospital or medical facility*)

DOE, John Joseph (Rnte, if any)

REGISTER NO. 123456 | WARD NO. T-18

AUTHORIZATION FOR TISSUE DONATION
Standard Form 522B

FIG. 5. Authorization form for contributions to the "bank."

termine whether residual moisture determinations represent the "free" water or whether "bound" water has been removed with subsequent significant protein alteration.

TISSUE PROCUREMENT

The recently deceased provides the source of all homografts. The donor must be free from all infectious diseases and malignancies in order to be eligible for aseptic tissue

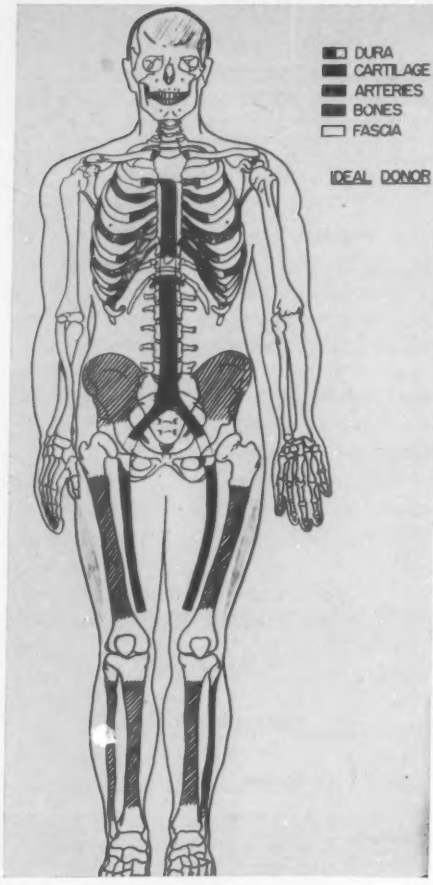

FIG. 6. Ideal Donor.

excision. The remains are maintained at approximately +4° C. in the hospital morgue. The operative procedure is begun and the enbloc dissection is completed within 24 hours after death.

The legal next of kin must express a desire to contribute the remains to the Tissue Bank in the form of a recorded telephone conversation, telegram or by signing the standard Tissue Bank Post-Mortem Agreement (Figure 5).

The ideal middle aged and elderly donors are eligible to contribute bone, skin, fascia, eyes and dura. The ideal young donor may contribute bone, skin, fascia, eyes, dura, cartilage and arteries (Figures 6 and 7). Youthfulness is a relative term embracing the age 33 plus or minus three years, depending on the gross observation of tissue suitability.

CLINICAL RESULTS

The development of a Tissue Graft Registry that is able to readily present data on the clinical success or failure of these stored homografts requires a continuing administrative effort. The evaluation of bone grafts consists of mainly x-ray examinations at six-month intervals following discharge from the hospital. Pertinent statistical information is tabulated on a special card which, by the use of color signals, facilitates rapid access to essential data. The administrative problems of transient population, the necessity for de-

IDEAL YOUNG DONOR

Tissue		*Size of Deposits*	*No. Deposits*
Bone	Cortical	10 × 1.5 cm	30
	Cancellous	1 oz. by volume	17
	Rib Sticks	(5) 6 × .5 cm	8
Skin	Split Thickness	500 sq. cm	13
Fascia		25 × 15 cm	1
		25 × 3 cm	5
Dura		6 × 9 cm	4
Cartilage		5 × 1 cm	15
Arteries	Thoracic Aorta	12 × 1.5 cm	1
	Abdominal Aorta	13 × 1-2 cm	1
	Femoral Arteries	14 × 0.5 cm	2
Eyes			2
Total number of deposits			99

FIG. 7. IDEAL YOUNG DONOR

TABLE 1

THE CLINICAL USE OF STORED HOMOGRAFTS

	No. Cases
Bone	2361
Skin	223
Fascia	202
Dura	102
Cartilage	136
Artery	97
Total	3121

tailed information and the need for long-term evaluation of large numbers of patients result in a sizeable lag period between surgery and the decision as to the graft's acceptability. The over-all trend in the use of freeze-dried bone homografts is summarized in Tables 1, 2, and 3.

Clinical evaluations of freeze-dried skin,[6] fascia,[7] and dura[8] have been reported recently and indicate the surgical trends. Further evaluations of these and other tissue homografts will be presented when the Tissue Graft Registry has enough information available to constitute valid statistical data; however, the short-term observations are sufficiently encouraging to warrant continuing clinical trials.

FUTURE

The future of the human homograft as a transplant which compares favorably with the autograft appears to lie in an interdisciplinary approach spanning the interests of biology, chemistry, higher mathematics and physics. The apparent key to the problem is currently the biologist, who has developed the second set concept as a method for host recognition of the homograft's systemic sensitizing capabilities, thereby permitting better and closer study of the homograft rejection response.

The homograft response of the host demonstrates varying degrees of graft rejection which reflect tissue type, dosage, that is, amount of tissue grafted, and viability and metabolic order of the transplanted tissue. To date, transplants that are largely connective tissue evidence the least graft rejection and present, therefore, the most successful reproducible surgical results. This is a modest accomplishment indeed as compared to the problems of the surgery of grafting and yet significant as an indicator for the future.

Some of the current fundamental investigative approaches which offer hope of early clinical trial follow:

An interesting and challenging basic accomplishment has been the development of clone cultures of human cells from normal anatomical sites by the Tissue Culture Division of the Tissue Bank, working under the direction and with the assistance of Drs. W. R. Earle and V. J. Evans (Tissue Culture Laboratory, National Cancer Institute, National Institutes of Health). Ideally, these cultures are cell strains developed from a single cell. This accomplishment offers the possibility of growing large populations of

TABLE 2

CLINICAL FOLLOWUP DATA

	No. Cases	Graft Successes	Graft Failures	Incomplete
Fresh Fractures	322	140	15	167
Ununited Fractures	369	156	35	178
Tumors and Cysts	265	105	4	156
Arthrodeses	206	79	18	109
Dental and Facial	164	77	3	84
Spine Fusions	718	—	—	718
Miscellaneous	171	36	6	129
Totals	2215	593	81	1541

TABLE 3

CLINICAL FOLLOWUP DATA:
NUMBER OF CASES TECHNICAL FAILURES

Fresh Fractures	14
Ununited Fractures	16
Tumors & Cysts	83
Arthrodeses	20
Dental & Facial	6
Miscellaneous	7
TOTAL	146

cells which theoretically offer the opportunity to evaluate in the test tube a particular cell response without resorting to the imponderables and other variables associated with clinical trials. Ideally such observations could be the basis for extrapolation to surgical trials with greater certainty and less investigative time and effort. The growing of clone cultures of many human tissues is a very real possibility at this moment. Before this approach with such cell strains becomes of investigative age, it must be reproducibly demonstrated that the cells of cloned cultures are truly representative and biologically capable of performing their metabolic functions in a manner which permits correlation with their function at the host site.

The joint efforts of the Tissue Culture Division of the Tissue Bank and the N.C.I. have developed clonal cultures of the human epithelial cell.[9] The clinical attempts to transplant this cell strain to three human volunteers were unsuccessful. Since it is necessary to remove these cells from their matrix in order to grow them successfully in Tissue Culture such a clinical failure was not unexpected.

Another approach which offers much, but remains to be proven, is the transplantation of human endocrine glands. Once the homograft rejection response is overcome, the endocrines offer the most realistic transplant challenge. Preliminary biological and clinical investigation shows that the endocrine glands lend themselves to current procurement, storage, tissue culture and surgical techniques. These tissues give evidence of withstanding the physical damage of freezing and storage in a predictable manner.[10,11]

Work in our laboratory verifies the observation of Gailland[12] that parathyroids and ovaries can be grown as fragments by current tissue culture techniques. There is definite clinical and laboratory evidence that homografts when appropriately shielded from the rejection response are successful at the hormonal level of function.[13,14]

It is a noteworthy theoretical methodological advantage that these ductless explants need only a vascular connection adequate for nutrition in order to discharge their function as a gland. When adequately vascularized at an appropriate anatomical site, theoretically they should follow the ebb and flow of the correlated hormonal demands of the systemic metabolic pathway. The problem of adequate human surgical instrumentation and associated techniques that must be comparable to successful techniques of small animal transplantation and tissue culture techniques of the laboratory is a current significant problem to us.

This discussion of tissue transplantation futures is frankly still largely a biological dream and in order to be species specific at the level of the human patient it must be pursued with infinite care and patience, superior instrumentation and intuitive but mature surgical judgment lest the biologist's dream be artlessly exploited and become the surgeon's nightmare.

This story of the Tissue Bank with its investigative and developmental multi-faceted challenges exemplifies the fascination of clinical research. To the clinician, young and old alike, this accomplishment re-emphasizes the ageless philosophy that the practice of medicine is not the scientific application of scientific principles but the artful application of scientific principle to the immeasurable complexities of the pathology of the sick.

SUMMARY

1. The recently deceased is an adequate source of human homografts of bone, skin, fascia, dura, cartilage and arteries.

2. The freeze-dry principle does not significantly alter the bone homograft's capacity for osteogenesis, although cell viability of the graft is not maintained.

3. Freeze-drying offers practical advantages for tissue storage from the viewpoint of centralization of procurement and processing, long-term storage and logistics.

4. Encouraging clinical observations warrant further clinical use of the freeze-dried homograft.

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Medical and Surgical Aspects of Open Cardiac Surgery*

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The military population has a right to expect that open heart surgery be made available, and the military medical services have an obligation to provide it.

The medical and surgical personnel must combine to effect accurate diagnosis, proper selection, optimum treatment and careful critical follow-up. Hypothermia, useful in the early correction of the simpler type defects, is now being largely replaced by the total bypass technique. With these techniques the simpler cardiac problems are now being treated surgically with acceptable surgical risks and good results. The more complicated problems are being attempted with hopeful results and the extremely complex problems are being approached with often encouraging results.

The military medical services are presently active and must remain active in this important area of medical progress.

THE PROGRESS in the management and treatment of cardiovascular diseases in the past decade has been so rapid that the surgical treatment of congenital and acquired lesions of the heart and great vessels has become quite routine. Consequently, the members of the Armed Forces and their dependents now have a legitimate right to expect that this type of specialized treatment will be made available to them. In the absence of any firmly established program for procuring such services from civilian organizations, the medical services of the Armed Forces have a strong obligation to establish and promote programs of cardiovascular surgery. These programs should be extensive enough to handle the load and advanced enough to satisfy the demand, being ever cognizant of the fact that purely experimental, dangerous procedures can not be accepted by our non-indigent population.

On the basis of this mandate, advanced treatment of cardiovascular disease by surgical means, specifically open heart surgery, has progressed rapidly in the services. The brunt of the burden has been upon the surgeons, yet the medical segment of this closely coordinated team which also must include x-ray, laboratory, anesthesia, and nursing personnel, has had important responsibilities. The Cardiologist has had the task of making the preliminary selection of patients for surgical consideration; he has the demanding obligation to accurately diagnose the nature of the disease or the defect, and to assess its severity; he is generally responsible for making and interpreting the physiological measurements necessary during surgery and in the post operative period and offering advice as indicated; he has the vital task of maintaining a thorough and critical follow-up program to objectively evaluate the results obtained by surgery. This latter is the crucial backward look which, for want of time, has not been done but which is actively now being done and will eventually bring into focus surgical indications and contraindications which are now sometimes largely conceptual and theoretical.

The experience to date has been very profitable to the Cardiologist. The opportunity of following cases through to a definite diagnosis has been educational, often painfully so, to such a degree that he has gained considerably greater diagnostic accuracy by clinical means. He has also developed an increased appreciation of the diagnostic limitation of catheterization and dye dilution studies. He

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has come to realize that the matter of the integrity of the lesser circulation is a vital parameter which he as yet has been unable to critically appraise. At the present time we believe that diagnosis by clinical means, including fluoroscopy and electrocardiography, is about 80% accurate; that an additional 10% can be added by including catheterization and special dye dilution studies; that whenever clinical diagnosis and catheterization diagnoses are incompatible, it is better not to ignore completely the clinical diagnosis; and that we are considerably short of 100% diagnostic accuracy by present means. It is hoped that with the development of the newer angiographic techniques diagnostic accuracy can be improved. In this area we have had very limited experience because of the unavailability of the necessary equipment.

The great majority of cardiac abnormalities or disease processes amenable to open heart surgical procedures can well wait until the patient is of suitable physical size to be more easily managed. In general, it is preferable to the surgeon to have the patient be at least 4 or 5 years of age. Likewise, the diagnostic accuracy of the physical examination, fluoroscopy, electrocardiography and catheterization is greater after this age. Nevertheless, should the problem appear to be of such severity that withholding of a surgical procedure until this rather arbitrary optimal age represents an abnormally high risk, the advanced diagnostic procedures and surgery can and should be done regardless of age. Palliative surgery may be profitably performed in this group to help the patient attain a better growth-health status, with the goal of possible total correction being more safely postponed to a later time.

The indications for cardiac catheterization and dye dilution studies are largely pre-surgical. They are well applied to borderline cases in which the need for or the feasibility of surgical procedures is not clear clinically. In most instances, cardiac catheterization and dye studies are performed as a final diagnostic refinement after a tentative decision for surgery has been made. Consequently catheterization is likely to be of decreasing necessity as general appraisal by lesser means becomes more reliable. In this regard it must also constantly be kept in mind that, with the recent tremendous increase in the volume of catheterization procedures being done, the radiation hazards, particularly to the operator, becomes a very serious matter. This may hopefully be minimized by increased use of image intensifier x-ray equipment, but the high cost of this equipment at present has precluded its general use in many of our military hospitals.

The earliest experience with open heart surgery by the author was with hypothermia, at Fitzsimons Army Hospital, Denver, Colorado, in late 1953. It proved to be a useful technique, applicable to the closure of atrial septal defects and the correction of pulmonary valvular stenosis. Under hypothermia the early technical problems of open heart surgery were met and solved and much valuable information regarding cardiopulmonary physiology was amassed. However, because pre-operative diagnostic accuracy was unequal to the requirement of not only establishing the presence of an atrial septal defect or a pulmonary outflow obstruction but also its location and type, the time limit for total occlusion under hypothermia occasionally precluded satisfactory repair. This fact, plus the chronic specter of ventricular fibrillation, resulted in hypothermia being used with decreasing frequency as the total bypass techniques became more workable. At the present time, total body hypothermia is rarely used by our organization. However, one is well advised not to completely eliminate this type of procedure. As increased workload places ever greater demands on blood banks it may be necessary for practical and economic reasons, to return to the use of hypothermia, either total, modified, or selective, for the simpler cases in order to get the total job done. The more recent inclusion of hypothermia as an ancillary measure during total bypass has been promising. This is accomplished by the addition of a heat exchanger in the circuit of total bypass set-ups allowing for rapid in-

duction of hypothermia where indicated. Rewarming is necessarily slow in comparison to cooling as the upper limits of the exchange heater are only a few degrees above normal for the blood, while the cooling range is much wider.

Our experience with the total bypass technique began in the spring of 1956 at Fitzsimons Army Hospital, using the DeWall-Lillehei bubble type oxygenator. It has proven to be a highly satisfactory unit and has remained our main means of enabling difficult surgery. We have had no experience with the Gibbons type oxygenator, but we have used the Kay-Cross disc type in the laboratory only. With total bypass, almost any type of acquired valvular lesion or congenital defect, excluding, of course, the atresias and myocardiopathies, can be theoretically attacked with varying degrees of success and at varying risk.

The surgical closure of atrial septal defects and ventricular septal defects and opening of pulmonary outflow obstruction under direct vision is now being done quite routinely with generally good to excellent results and with an acceptable mortality rate.

The cases selected for surgery are governed by the size of the shunt, the degree of pulmonary vascular resistance, and the degree of right ventricular hypertension in the pulmonary outflow stenoses. Those cases of septal defects in which there is a high, fixed pulmonary vascular resistance of such a degree that the shunt is partially or totally reversed to a right to left shunt at all times are generally considered inoperable since there are no surgical means of overcoming advanced pulmonary arteriolar changes and medical measures are extremely unrewarding. Cases of septal defects without pulmonary hypertension, with less than a 2 volume % shunt in atrial septal defects and less than 1.5 volume % in ventricular septal defects probably do not justify the risk of surgery on the basis of present knowledge. All cases lying between these two extremes are considered surgical cases with varying degrees of severity, urgency, and surgical risk. Cases of isolated pulmonary valvular and infundibular stenoses with right ventricular pressures greater than 50 mm Hq. and gradients of greater than 25 mm Hq. probably justify surgical correction.

The management of the tetralogies is a dilemma. The acyanotic cases are best treated as members of the septal defect group to which they are related. We would prefer to procrastinate on the cyanotic tetralogies. In this latter group the risk and promise of corrective surgical procedures depends to a considerable degree upon the status of the pulmonary vasculature beyond the valvular or infundibular stenosis. In those cases with marked hypoplasia of the pulmonary vasculature beyond the valve the results are relatively poor and the risks high. In cases with good vascular channels the results may be expected in time to approach those of the acyanotic tetralogies. Selective angiography is only helpful in evaluating the nature of the pulmonary vascular structures prior to surgery. In our limited experience the mortality at surgery in the cyanotic tetralogy cases has been in the vicinity of 25% and the end results not too encouraging. However, clinics in which large numbers of these cases have been and are being done, have succeeded in lowering the mortality rate to a much more acceptable figure. As our experience with this type case increases and as our ability to better evaluate them prior to surgery improves with a resulting better selection of patients, the mortality rate can undoubtedly be reduced, and our indications for surgery liberalized. Because of the added technical problems associated with a corrective procedure done after a palliative procedure, routine use of a Potts or Blalock procedure is probably inadvisable, though it most certainly has occasional application. It is felt that should the condition of the patient demand it, as manifested by development of prominent polycythemia, syncopal episodes, vascular thrombosis or impaired growth and development, a corrective type procedure should be considered.

Cardioplegia used in the correction of ven-

tricular septal defects has enjoyed popularity in some clinics. There are others who feel that this maneuver is dangerous because of the profound myocardial injuries associated with the prolonged myocardial anoxia. Variations in methods for producing cardioplegia may result in lesser degrees of myocardial damage. Recently, cardioplegia has been produced by isolated perfusion of the coronaries with cold oxygenated blood. This technique allows for decreased myocardial oxygen demand and thus less anoxic muscle damage. However, the danger of ventricular fibrillation persists. Rapid rewarming of the heart is accomplished by releasing the retrograde aortic flow. Most ventricular septal defects can be repaired without cardioplegia. We feel that cardioplegia is not necessary except in rare instances and that recovery is enhanced by a more healthy myocardium.

Admittedly, the basis for selection of cases for surgery is not very clearly delineated. It will require at least 50 years of observation and evaluation of the long term results of surgery done on the above basis with a critical comparison to the natural course of these various diseases, which unfortunately has never been well worked out, before surgical indications can be critically set down. Meanwhile, sound logic and consensus of opinion must remain our guides.

There is a rather sizable group of cardiac problems, relatively uncommon, difficult to correct, with increased and variable surgical risks, in which our experience has been limited but in which we feel open heart procedures may be justified. These include sinus of Valsalva to RA fistulae, aorto-pulmonary windows, tricuspid stenosis or atresia, A-V canals, aortic stenosis congenital or acquired, rheumatic mitral insufficiency, rheumatic tricuspid insufficiency, aortic insufficiency, myocardial aneurysms, single ventricle, and myocardial rupture. It is expected that with increasing experience we will be attempting to correct progressively larger numbers of these cases.

It is felt probable that surgery for rheumatic mitral stenosis may one day be better accomplished under direct vision. This is particularly true in those cases showing marked calcification in the valve leaflets and in those in whom a more than minimal degree of insufficiency is suspected or proven. By the total bypass technique calcific debris which ordinarily would enter the general circulation to produce embolic processes will be removed in the oxygenator filter. Furthermore, it would be possible to make at least some effort to correct the insufficiency, in addition to making a more specific correction of the stenosis under direct vision. However, at this time mitral stenosis is being routinely and preferably treated by the well established, blind finger manipulation.

There remains a fairly sizable group which, in spite of the remarkable progress in the beneficial application of surgical techniques, is not presently amenable to surgical treatment. This includes the group well called the hypoplastic left heart cases, which includes hypoplasia of the aortic arch, aortic valve atresia, mitral valve atresia and combinations of these, the myocardiopathies, coronary atherosclerosis, Ebstein disease, truncus arteriosus without reduced pulmonary vasculature, transposition of the great vessels, some cases of total anomalous pulmonary venous drainage, primary pulmonary hypertension, cases of severe secondary pulmonary hypertension, and various incorrectible combinations. The surgical approach to this group must be considered as largely experimental and as such is not our present prerogative. Nevertheless, we remain extremely interested in following this experimental surgery and are prepared to adopt any proven or promising procedures that may be developed. Along this line the recent advances in the handling of transposition and the use of prosthetic valves have been stimulating and promising.

Vascular surgery per se has not been specifically covered in this discussion because of the implied limitation of the assigned topic. Yet it certainly is extremely important, perhaps even more to the military than to the civilian population, since the management of casualties sustaining vascular injuries has

been a big problem and may at any time become an almost overwhelming problem. Suffice it is to say that a vast amount of experimental and clinical work has and is being done on the correction of not only traumatic vascular defects but those due to atherosclerosis as well, occasionally applying modified bypass techniques and hypothemia.

In the broad area of open heart surgery the medical services of the Armed Forces have remained close to, but admittedly and properly, slightly behind, the pioneers and the front runners. In order to remain in such a position they must continue, by hard work, by increasing their training programs, and by optimum utilization of their properly trained personnel, to progress in their ability and to expand in their capacities in order to discharge their responsibilities to the members of the military service and their dependents, and to maintain the technical proficiency needed to meet the unexpected demands that are the heritage of the military medical services.

"Most of the conspicuously heroic deeds of war have been carried out by individuals or troops where discipline of volition existed—where officers have succeeded in making themselves the guardians of their men's interests and in return have gained unstinted devotion from their troops."—Lt. General Arthur G. Trudeau, U. S. Army

Nursing Care for Patients Treated by Open Intracardiac Surgical Procedures*

By

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NURSING care for patients treated by open intracardiac surgical procedures is fast approaching the framework of a nursing specialty, both in civilian and military nursing. During the past ten years newly developed surgical procedures, along with improved anesthesia controls and diagnostic methods, have opened up a new phase of nursing for the patient with congenital heart disease. In the medical evaluation of the patient, various methods of study are employed. The surgical corrections of some congenital defects require opening the heart. These procedures require that the action of the heart and lungs be taken over by a mechanical means. The intensive nursing care associated with the evaluation of the patient, his surgery and his postoperative care becomes a definite responsibility of nursing service. The program of care as it is administered at Walter Reed General Hospital is presented herewith.

In the military hospital, congenital heart disease is observed principally in patients who are the wives and children of service men. Approximately six babies in a thousand live births are born with a congenital heart lesion. Thirty-two per cent of this group die in the first year.[1] This sounds ominous in its implications to future planning for medical and nursing care. However, this incidence loses significance when it is compared with the overall figures of cardiovascular disease patients. Modell and Schwartz estimated that seventy-five per cent of the patients seen in a typical large outpatient department have cardiac symptoms.[2] Congenital lesions comprise only one per cent of all heart disease, but ten to fifteen per cent of all heart disease in children.[3]

The pioneers in open intracardiac surgery have developed safe procedures for correcting atrial septal defects, ventricular septal defects, pulmonary stenosis, anomalous pulmonary venous drainage, and the various combined lesions such as tetralogy of Fallot. However, before any correction is attempted, the patient is carefully evaluated to determine the precise diagnosis, the extent of the defect, and the risk which is involved.

MEDICAL EVALUATION

The original cardiac evaluation of the patient under consideration for open-heart surgery is accomplished by the members of the Cardiology Service of the Department of Medicine. This evaluation normally requires several days of hospitalization, depending upon the condition of the patient and the successful completion of adequate diagnostic studies. The patient may be in poor physical condition and require supportive medical care before further diagnostic procedures can be accomplished. This may be done in some instances with corrective diet, intensive vitamin therapy, transfusions, and other supportive measures. Diets are designated according to the condition of the patient. If he is undernourished, the diet is high caloric; if he is obese, the diet is low fat, low caloric; if edema or cardiac decompensation is evident, the diet prescribed is regular salt-poor or salt-free.

When the patient is admitted to the hospital for evaluation it is often evident that he and his family are frightened. They are often uncertain as to the prognosis and what to expect. They are frightened of the un-

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known quantity. It is during this interim that the most effective psychological preparation is possible. Every member of the nursing team and the attending medical staff should take advantage of opportunities to prepare the patient and his family for his anticipated experiences. When the patient learns that he will have a satisfactory explanation to his questions from anyone entrusted to his care, the frightening unknown quantity becomes less ominous.[4]

The evaluation of the patient for intracardiac surgery may require only a brief time (usually three days), since seventy per cent of the patients who are seen by the Cardiology Services are referrals. In general, one-half of these patients are here because "someone heard a murmur." The other half are brought for medical attention because they have failed to thrive, they are prone to frequent infection, or they are cyanotic. Cyanosis is a symptom of one-fifth of the patients seen in this group. The referred patient is given an appointment to report to the Cardiology Clinic with his complete medical records, x-rays, and electrocardiographic tracings for screening. If the latter data is not clear or fairly recent, repeat procedures are done during this visit. On the second day a cardiologist obtains a clinical history and does a physical and fluoroscopic examination of the patient. The third day he presents all the findings on the patient at cardiology conference which includes a representation of the thoracic surgery staff. These findings may be conclusive enough for the recommendation of surgery. However, if the diagnosis is doubtful or another diagnosis is suspected, various other methods of study may be employed.

First among the various methods is a right heart catheterization.[5] This involves introducing a catheter into a basilic or saphenous vein. With the aid of fluoroscopy this catheter is manipulated into the right side of the heart and as far as possible into the lung field through the pulmonary artery. The catheter tip may enter into abnormal positions through various defects. Pressure is recorded constantly by means of a Statham strain gauge connected to an electronic recording device. As the catheter is withdrawn in stages, 2-3 cc. of blood are secured for determination of oxygen content at various points of withdrawal. Blood samples may be taken from the two chambers simultaneously by means of a special double-lumen catheter. These multiple small samples can be withdrawn through a Waters' cuvette oximeter and immediate oxygen saturation obtained after a dye solution has been injected intravenously.[6] There are ear oximetry and electrocardiographic monitoring through the procedure, which may require 2½-3 hours.

For this right heart catheterization the patient is not allowed to have anything by mouth for several hours previous. At the appointed time he is taken by stretcher to the anesthesia induction room. Here an anesthesiologist administers an intravenous injection of nembutal and morphine for basal anesthesia. After a few minutes of observation the patient is taken to the Cardiology Laboratory for the right heart catheterization. Following this procedure, he is returned to his own bed where he remains flat in bed for 24-72 hours. First ambulation entails a walk to the bathroom, accompanied by an attendant. Food and fluid intake depend upon the patient's tolerance. Frequently patients are nauseated following this procedure.

Other methods are employed to visualize the cardiovascular system by multiple x-ray exposures following the injection of a contrast medium. In venous angiocardiography the operator injects contrast medium by hand syringe. A rapid film changer gives the multiple exposures which record the path of the medium.[7]

Regional or selective angiocardiography affords a more precise picture of the intracardiac defect. Through a venous cut-down of the basilic or saphenous vein and with assistance of fluoroscopy, the operator introduces a Lehman catheter and manipulates it into the right atrium, or the right ventricle,

or, if there is an atrial septal defect, the left ventricle. The contrast medium is injected by the Gidlund pump and the rapid film changer makes 60 exposures, 30 in each of two planes.[8]

Retrograde aortogram seems to be the method of choice for identifying malformation of the aorta or extracardiac defects. Using fluoroscopy to visualize the path, the operator threads a modification of the Lehman catheter as employed at the National Institute of Health into a cutdown of the radial, superior femoral, axillary or carotid artery. Here, also, the Gidlund pump is employed to inject the contrast medium before the multiple exposures are made by the rapid film changer.[9]

The angiocardiography procedures are completed in the surgical diagnostic room of the Operative Service. The patient is given an inhalation intravenous type anesthesia and respiratory assistance in order to provide respiration control at the time of the rapid multiple film exposures which are made at the rate of five in each plane per second. Following any of these procedures, the patient is observed in the Recovery Room for approximately two to four hours. Otherwise, the follow-up care is the same as that for the right heart catheterization.

A left heart catheterization is performed in the operating room if valvular disease of the left heart is strongly suspected, especially mitral insufficiency or aortic valvular disease. In this situation the decision for surgery depends upon the degree of difficulty associated with the lesion. This procedure involves bronchoscoping the patient in order to thread a polyethylene catheter through a long needle which is used to puncture the left atrium through the coryna. The nursing care following this procedure is essentially the same as that for a bronchoscopy.

After the selected study has been completed, the patient with his complete clinical records is again presented to the cardiology conference, where final decisions are determined. Surgery is vetoed for the patient who has a minor lesion with no symptoms, or a lesion in which complications are unlikely, but the surgical risk is great; for example, a small ventricular septal defect. Also, surgery is not recommended in conditions for which no successful surgical procedure has been devised, as in acquired mitral insufficiency.

Depending upon the urgency of the corrective measure, the patient is given a scheduled appointment for surgery and returns to his home until about 2-3 days prior to his scheduled date for surgery when he returns to the hospital for admission to a surgical ward for his preparation for surgery.

Preoperative Preparation of the Patient

The preparation for surgery commences promptly with the patient's admission to the ward. He is ambulatory normally and may be with his family; if a child—with his parents. While it is essential in accepted nursing practices that the nurse must be well oriented to the surgeon's plan of care in devising certain aspects of the nursing care plan, it is particularly significant in the care of the patient for cardiac surgery. The nursing staff orients the patient to the necessary procedures for preoperative care, the significance of the recovery ward and his eventual return to his home ward. The nurse must be astute in observing the psychological, physical and emotional needs unique to the individual *patient* and support accordingly. It has been observed that the placing of the preoperative patient in the same environs of the convalescent postoperative patient contributes immeasurably to the well-being of the new patient. The doctors, too, contribute generously of their time in explanation to the patient and his family—just what to expect, and the risk involved. The surgical team realizes that it must understand all the personal aspects of the patient's problems in order to contribute successfully to his total care. In order to have the family close at hand, usually the patient is placed on the "Seriously Ill List." This insures frequent

visits of the chaplain. The husband or the father of the patient should be present before surgery is initiated, even if it requires securing his return from an overseas assignment. The forwarding of a blood sample to the blood bank with a request for ten heparinized and four ACD units of blood for use on the day of surgery is accomplished. A physiotherapist starts the patient on breathing exercises preoperatively and continues same postoperatively. The afternoon prior to surgery the preoperative shaving is accomplished which consists of removing all hair, including the axillary and pubic from the neck to mid-thigh. If the patient is receiving digitalis, the nurse makes a special note to this effect on the front of the chart. The anesthesiologist visits the patient the afternoon before surgery. He prescribes the preoperative medication depending upon the physical proportions, age, weight and temperament of the patient. This usually includes a barbiturate or opiate with scopolamine or atropine. The nurse instructs the family that they may wait during surgery in the waiting room near the operating suite.

Pump Oxygenator

For open intracardiac operations the heart must be empty of blood sufficiently long to enable the surgeon to observe and to repair the defect. Since this may require 10-60 minutes to accomplish, it is necessary to employ a mechanical means outside the body for oxygenating and pumping the blood to all the body structures for life maintenance. Therefore, this mechanical means is called a "pump-oxygenator."[10]

In this discussion the pump-oxygenator described is the Mayo-Gibbon type. This model provides for the patient's venous blood to flow over vertical stainless steel screens for oxygenation and elimination of carbon dioxide. Flow rates are computed in relation to square meters of the patient's body surface area which is determined by plotting the patient's height and weight on a nomagram.[11]

The normal cardiac output is thought to be about three liters of blood per minute per square meter of body surface area. However, Kirklin of the Mayo Clinic suggested that the patient, who is under light anesthesia, has a twenty-five per cent reduction in these normal figures. Therefore, in order to maintain the all important ideal oxygen tension of tissue cells with the use of the pump oxygenator, flow rates of 2.2 to 2.5 liters per minute per square meter of body surface are selected. To this flow is added a 10-12 liter flow of oxygen from which the blood picks up its deficit. The controls of the mechanism are such that the volume of blood in the pump oxygenator remains constant. This insures that it returns to the patient's arterial blood in the exact amount that it receives venous blood.[12]

Preoperative Preparation of Equipment

In order to safeguard the patient during the use of this outside-the-body blood circuit, detailed precautions are taken in processing the pump oxygenator for use. The blood circuit includes stainless steel or plastic catheter cannulae, tygon tubing connecting lengths, lucite chamber units, stainless steel connectors, lung screens and filter screens, and latex rubber pump boots. Particular attention is given to eliminate foreign material and to prevent hazing and scratching of the lucite parts. The plastic tubing is discarded after one use.

When a patient is scheduled for surgery, the surgeon prepares a data information sheet which gives the surgical team essential information for preparation. The pump technician prepares the designated number of screens for the lung which has been plotted to obtain the desired flow rate. These may vary from four to fourteen, depending upon the body surface area of the patient. The technician cuts proper lengths of tubing for the machine and pre-assembles the circuit by units. The open ends allow for gas permeation in sterilization. The units are carefully packed into perforated stainless steel containers to protect the lucite parts and their nipple extensions and to prevent pressure

depressions in plastic tubing.

The nurse prepares the instruments for the surgical procedure, an arterial cut down tray, the sterile equipment necessary for monitoring systemic and intracardiac pressures, and extra syringes and needles.

On the day prior to use, all the equipment for the intracardiac procedure is sterilized by ethylene oxide gas in the hospital Centralized Materiel Section. Spore strips are used in selected recessed areas to test the effectiveness of the gas operation. The entire process from sterilizer door closing to door opening requires eight and one-half to nine hours. This involves a gas penetration of Carboxide, which is 90% carbon dioxide and 10% ethylene oxide under pressure of twenty-nine to twenty-six pounds per square inch. The humidity is twenty per cent and the temperature is set at 120°F. for eight hours' exposure.[13] Although a much shorter time of processing is available with a higher temperature, the danger of hazing the lucite parts is greater.

The technicians who are assigned to the care of the pump-oxygenator take exclusive care of its processing excepting the operation of the gas sterilizer. In this function the non-commissioned officer in charge of the Central Materiel Section officiates.

The sterilized units are assembled in the operating room on the day of surgery. Two of the pump technicians surgically scrub to remove the parts from their containers, to tighten bolts, to add a defoaming agent, to prepare the air-free level sensing devices, to remove the spore strips, and to finger-cot the open-end tubings. After this is completed, the technicians remove gowns and gloves to assemble the parts on the chassis of the machine and ready it for use.

Operative Procedure

Everyone starts an early day for open intracardiac surgery, including the patient. He may receive one part of his medication at 0500, the second at 0600. An operating room technician brings the patient to surgery by stretcher at 0700. Although the patient is awake upon his arrival in surgery, he does not appear to be apprehensive. He seems to be cognizant of what is going to happen next. The anesthesiologist and head nurse greet and weigh the patient before transferring him to the operating table. To the scale is added a catheter, a chest drainage tube, a Levin tube, clamps dressing and sheet so these factors will equalize that which will be attached to the patient following surgery.

The patient is then taken into the operating room where he sees the two scrub nurses who are preparing the sterile tables for the procedure. He sees the anesthesia and monitoring equipment but does not seem particularly awed by this elaborate preparation. The anesthesiologist performs an endotracheal intubation and uses pentothal, nitrous oxide and oxygen and anectine for anesthetic agents to maintain the patient in a light anesthetic and paralyzed state with controlled respirations. He places the electrocardiographic leads on the patient and connects them to a cardioscope which is placed in easy view for both surgeon and anesthesiologist. He establishes intravenous routes in the left foot and in the left hand for the administration of blood and drugs as indicated. Lastly, he positions the patient according to which surgical approach is to be used. He also is responsible for maintaining a tally sheet of the fluid balance for estimated blood loss. In determining blood loss, all intake and output is calculated. The circulating technician reports to him the suction bottle drainage, urinary drainage and the weight of blood sponges.

The nurse prepares for her sterile trays in the sequence of their use. As soon as the patient is asleep, a surgeon makes a cut-down on the left femoral artery for threading a polyethylene catheter which is used to record systemic arterial pressure. A second surgeon prepares the monitoring equipment. The first surgeon continues the preparation after the femoral catheterization has been sealed off and securely protected so that the artery can still be used to record pressures

postoperatively if desired. He catheterizes the bladder using an indwelling catheter and connects it to a drainage bottle. He then changes gloves and surgically prepares the skin with a surgical soap and water scrub and an iodine and alcohol solution paint. The prepared area includes the entire torso from the neck to the pubis and the mid right thigh.

The nurse and doctor drape the patient to margin two operative sites—the chest and the right femoral area. The nurses place a Mayo instrument table for the "knife, scissors, hemostat, and sponge stick" use. But they also bring up over the foot of the patient to be included in the drape an over-bed table which enables them to stand on high stools and to stay at the field rather than step down and turn for items which are kept on the reserve table. The nurse who is in first scrub position stands on the right side of the patient as do the surgeon and the pump oxygenator. The second scrub nurse stands on the opposite side where the reserve supplies, instruments, cannulae, tubing and syringes are in readiness. A circulating technician connects the suction, moves the bovie unit just under the edge of the overbed table, and connects the cord which the nurse threads through the drapes under the table. The surgeon paints the skin again with an iodine-alcohol solution and injects the skin and subcutaneous tissues at the site of the chest incision with saline and adrenalin solution. He exposes the femoral artery and threads a polyethylene catheter into the saphenous vein for monitoring purposes. He makes a vertical mid-sternotomy incision with a scalpel and uses the Bovie for hemostasis. Using a cutting current he incises the fascia of the sternum with the cautery knife and splits the sternum with a Lebsche knife. Bone wax is used to control the bleeding points of the sternum. He opens the right pleural space widely for evaluation. Intracardiac pressures are monitored and recorded. The surgeon places umbilical ties individually around the superior and inferior venae cavae. These tapes are threaded onto a Rumel tourniquet which will control the flow of blood through cannulae. After proper preparation, he opens the right auricular appendage and inserts a finger to explore for an interatrial septal defect or an interventricular septal defect. When the exploration is completed, he places a "bulldog" or arterial clamp on the appendage. At this point the anesthesiologist gives heparin to prevent coagulation of the blood in the circuit. The surgeon cannulates the femoral artery with the largest size cannula it will admit and connects this to the filled line of the heart-lung machine. The inferior vena cava is cannulated through an opening in a prepared area in the wall of the right atrium and the superior vena cava through the atrial appendage. These cannulae are tied in place and connected to a Y-adapter which in turn is connected to the venous line of the heart-lung machine. The patient is now ready for by-pass circulation. When by-pass is in progress, the anesthesiologist inflates the lungs gently with a helium and oxygen mixture which remains in the aveoli until the patient comes off by-pass.

When the surgeon has completed the sternotomy incision, the pump technicians bring the machine into the room at a position directly behind the surgeon. The power and suction are connected and the circuit is primed with 7-8 units of heparinized blood. When the venae cavae are ready to be cannulated, the surgeon gives the pump team instructions to begin filming the blood (causing the extracorporeal circuit to flow over stainless steel wire screens in an even film). The period of initial by-pass is one of apprehension, for mechanical errors which become apparent must be corrected immediately. If a cava cannula is angled so it is against the wall of the vessel, the venous return will be poor. The machine returns to the patient arterial blood equal to the amount of venous flow it has received, therefore the arterial pump will be very slow until the cannulae are adjusted adequately. If something or someone unwittingly exerts occluding pressure on the arterial tubing, line pressure can be built up so rapidly that it

may cause a blow-out at the weakest point of the arterial line which will be at some connection.

After a careful check point review, the surgeon makes a ventriculotomy or artiotomy incision as the need may be, makes his repair by excision, direct suturing, or insertion of patch. An assistant keeps a suction in the chamber to reclaim the blood which is a backflow from pulmonary vessels and normal conornary lymph flow. When the heart incision is closed and upon instruction from the surgeon, the pump technicians clamp off the surgeon's lines but retain filming of the screen by recirculation until the surgeon is convinced that the repair is effective and the patient's heart is capable of resuming its own function. After pumping ceases, the surgeon decannulates the vessels. The anesthesiologist now gives protamine in a calculated dose to offset the heparin. Blood samples are titrated to determine if adequate protamine has been given. The surgeon closes the atrial appendage and the femoral artery wounds, inserts a catheter for chest drainage, and gives meticulous attention to hemostasis during the wound closures.

The pump technicians remove the machine from the operating room to begin its processing. They collect the blood in the priming reservoir, drain off the circuit blood and replace this with a detergent solution which is circulated for ten minutes. They disassemble the parts completely, using a forceful stream of water to rinse, immerse them in detergent solution for thirty minutes and rinse for a prolonged period with a forceful stream of water.

By the time the surgeon has completed his closure, the patient has reacted. When he appears to be stabilized in blood pressure he is again weighed to determine by weight differential if his blood volume equals that prior to surgery. At this point he is placed in his bed and taken to the cardiac unit of the Recovery Room.

During the procedure the chaplain visits the operating room suite and contacts the family, who are in the waiting room near the operating suite. As soon as the surgeon can leave, he personally informs the family of the condition of the patient and of the surgical procedure accomplished.

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Myocardial Infarction as the Initial Manifestation of Polycythemia Vera

By
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THE concomitant occurrence of myocardial infarction and polycythemia vera poses the question of causal relationship. There are only two reports dealing with myocardial infarction in the course of previously undiagnosed polycythemia vera.[1,2] The first one[1] only briefly refers to such a case, while Vacca et al.,[2] give a complete account of their case. This paper, therefore, is a report of only the third such case which appears of special interest as it suggests a connection between the two diseases.

The patient, a 49-year old man, was admitted to the hospital on November 26, 1958, because of a severe substernal pain radiating to the right pectoralis muscle area. Five days prior to admission the disease started suddenly with severe headache, nausea, and general malaise. There was lack of appetite, but no chills or fever. Temperature on admission was normal; the white blood cell count showed 17,200 (baso.2, eos. 3, seg. 75, lympho. 20); the red cell count 6,700,000; hemoglobin 138%; platelet count 200,000; sedimentation rate 1. The electrocardiogram showed an anterior wall infarction of recent origin.

The patient was placed and maintained on proper anticoagulation therapy with dicumarol, and bed rest with bathroom privileges. On the third hospital day the patient complained of pain in his neck muscles, and on the fourth day he developed a thrombophlebitis of the left long saphenous vein for which sublingual parenzyme was ordered.

During the ten days which followed, he seemed to make an uneventful recovery from both vascular episodes, when he suddenly was seized by left parasternal pain and went into shock and required the administration of oxygen, morphine, and aramine. The electrocardiogram now showed, in addition, a new posterior wall infarction. The serum glutamic-oxalacetic transaminase test was 61 and the sedimentation rate two. During the subsequent six days the patient ran a febrile course with temperatures up to 102°F. There were mild respiratory difficulties.

As the patient began to improve he developed periods of profuse perspirations several times daily, numbness and pain in the middle and ring fingers of both hands, burning of the eyes, coolness of both feet, and persistent pain in his third right toe. Attacks of dizziness and bigeminy added to the difficulties. He had no "ruddy complexion."

The patient refused the standard treatment for polycythemia vera with phlebotomies, radioactive phosphorus or myleran. He was discharged on the 56th hospital day to be followed on an ambulatory basis.

Seven months after onset of his illness his liver and spleen became palpable. On September 22, 1959 his red blood cell count was 8,743,000; white cell count 18,700; and hematocrit 70%. There were no cardiac difficulties.

DISCUSSION

In the case of Vacca, et al., the diagnosis of polycythemia vera was apparently a surprise finding on routine laboratory examinations. In the case at hand here one gains the impression that this was a clinical picture of polycythemia vera complicated by vascular occlusions.

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Untoward Reactions in the Chemotherapy of Pulmonary Tuberculosis

By

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(With seven illustrations)

THE years since 1946 have seen a drastic change in the prognosis of patients suffering with pulmonary tuberculosis. During this time, chemotherapy has become the standard method of treatment with supplemental surgery in special cases. During the last eighteen months at Fitzsimons Army Hospital, there has not been a treatment failure among over three hundred original treatment cases receiving adequate chemotherapy programs with resectional surgery added as necessary. Treatment in this hospital is based on the use of combinations of streptomycin, isonicotinic acid hydrazide (INH) or para-aminosalicylic acid (PAS), with other drugs being reserved for use in patients whose organisms are resistant to one or more of the above drugs.

In view of the proven effectiveness of chemotherapy, the following points can be made concerning the management of tuberculosis under present day standards:

1. Every patient with active tuberculosis should receive chemotherapy.
2. Chemotherapy should be started as soon as possible, realizing that the longer a lesion exists prior to chemotherapy the less is its chance of being reversible.
3. Chemotherapy should be of long duration, probably never less than a year, and at least until the disease has reached the inactive stage by National Tuberculosis Association Standards.
4. Chemotherapy should always consist of at least two drugs to which the organisms are sensitive, administered in adequate dosage.

Toxic reactions to the antituberculous drugs are not common, but when they occur in a severe form, they are a hazard to the patient, not only by virtue of the toxicity of the drugs, but in that they prevent his receiving the most effective treatment for his disease.

Two cases of toxic reactions attributed to antituberculous drugs will be detailed below.

Case No. 1. C. A., a 32-year-old male of Japanese extraction, was admitted to Fitzsimons Army Hospital on 8 January 1957 with a diagnosis of right pleural effusion due to tuberculosis. The effusion was found on 3 December 1956 on a routine x-ray examination.

On 9 January 1957, therapy with INH, 600 mg., PAS, 12 gm., and pyridoxine, 100 mg., daily was instituted. On 12 February, he complained of general malaise and shaking chills, and his temperature rose to 104.6°F. A generalized, bright red, macular eruption was noted. PAS was discontinued and he was treated symptomatically with antihistamines and medicated baths. There were generalized lymphadenopathy and marked scleral icterus. The liver was tender and enlarged to three fingerbreadths below the costal margin. His white blood cell count was 40,850, with 35% neutrophils, 38% lymphocytes, 2% monocytes, and 25% eosinaphils. INH was discontinued on 13 February. By 16 February, he had developed a much more severe eruption and exfoliation had begun over the face which subsequently became generalized (Figures 1 and 2). Treatment was instituted with parenteral ACTH, 40 units, and oral prednisone, 60 mg., daily. These drugs were gradually discontinued during the next thirteen days. By 1 March 1957, he had improved markedly. The jaundice had subsided but his exfoliation continued to be quite severe (Figures 3 and 4).

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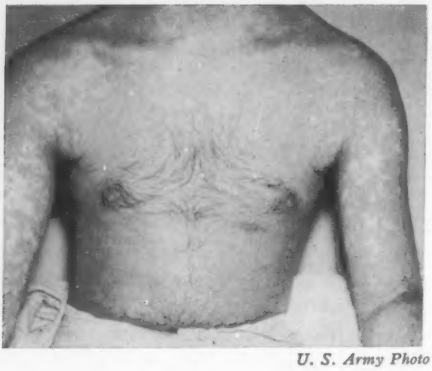

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FIG. 1. Generalized erythema multiforme-like erythroderma occurring after 36 days of drug administration.

During the next six months, he received no chemotherapy other than antihistamines and medicated baths for his exfoliative dermatitis, together with strict bed rest for his pulmonary tuberculosis. On 21 August 1957, therapy with streptomycin was begun and no untoward reactions were noted. Cycloserine was started on 15 October 1957 in a dosage of 500 mg. daily. At the end of three months of treatment with streptomycin and one month of cycloserine, he complained of severe pruritus and again started to exfoliate. The drugs were then stopped. After November 1957, he received no further drug therapy and treatment with bed rest was continued. His x-rays remained stable and by 8 December 1958 he showed no evidence of pulmonary tuberculosis and was returned to duty.

Laboratory Findings. The white blood cell count gradually fell from a high of 41,000 on 18 February 1957 to 21,000 by 18 March, and to 12,000 by 25 November 1957. Normal was not reached until 1 February 1958, one year after the onset of his drug reaction. During this period, the neutrophil count varied from 40 to 53%, with a normal of about 64% being reached on 1 February 1958. The eosinophil count remained at an average of 25% from 18 February 1957 until 25 November 1957. From the latter date until 1 February 1958, it gradually fell to a normal of 4%. Serum bilirubin 16

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FIG. 2. Marked facial edema with beginning exfoliative dermatitis of face after 36 days of drug administration.

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FIG. 3. Exfoliative phase of generalized erythroderma 38 days after Figures 1 and 2.

February 1957 was 5.3 mg.%, with gradual fall to normal of 0.6 mg.% by 18 March 1958. Alkaline phosphatase gradually fell from a high of 17 SJR units on 19 February 1957 to a normal of 6.25 SJR units on 18 March 1958. The electrocardiograms and urinalyses showed no abnormalities throughout the illness.

Intradermal tests were performed as follows: INH aqueous solution, 1:10, 1:100, 1:1000, all negative. PAS aqueous solution, 1:10,000, 1:20,000, 1:30,000, all negative. Streptomycin aqueous solution, 1:100, 1:1,000, 1:10,000, all negative. Patch tests to pastes of all three drugs were also negative at 48 and 72 hours.

Case No. 2. B. R., a 30-year-old white female, was admitted to Fitzsimons Army Hospital on 7 March 1955 with the diagnoses of tuberculosis, pulmonary, active, moderately advanced, and dermatitis medicamentosa.

In 1952, she developed an upper respiratory infection which did not completely clear, and a nonproductive cough persisted. In October 1954, she developed purulent sputum, anorexia, increased fatigability, chills, and fever, which would rise as high as 102°F in the afternoon. Night sweats and weight loss of twenty pounds prompted her to consult a physician in December 1954, and cavitary tuberculosis was discovered on chest x-ray (Figure 5). Sputum smears and cultures were positive for acid-fast bacilli. On 7 January 1955, she was started on Streptomycin, 1 gm. three times weekly, and PAS, 12 gm. daily. On 13 January 1955, INH in a dose of 300 mg. daily was added. On this program, she gained weight, became afebrile and her pulmonary lesions improved. On 24 January 1955, she developed cervical adenopathy, fever, and chills. On 26 January, a generalized maculopapular eruption occurred and she began to exfoliate. On 1 February 1955, her temperature began to rise to 104°F in the afternoons and generalized arthralgia developed. At the time, the streptomycin and PAS were discontinued, but the INH was continued in the previous dosage. During the remainder of February 1955, she contiuned to exfoliate, lymphatic enlargement occurred and a bromsulphalein determination revealed 23% re-

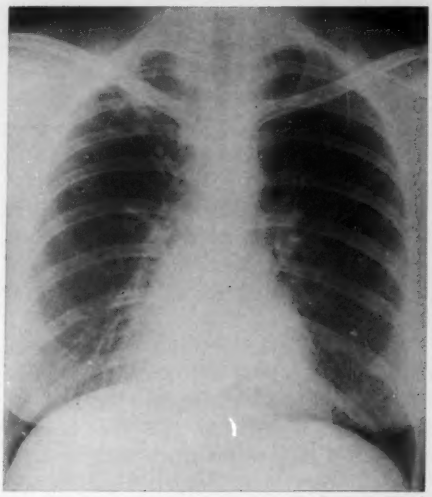

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FIG. 5. Roentgenogram of the chest in December 1954 showing severe right upper lobe cavity tuberculosis.

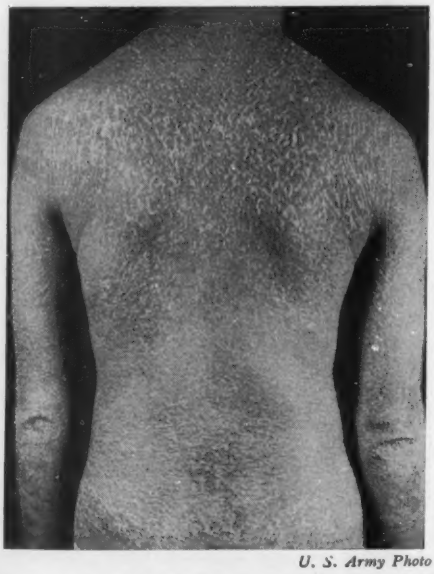

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FIG. 4. Exfoliation of trunk 38 days after Figures 1 and 2.

tention. For the period from 6 February 1955 until 15 February 1955, she was treated with intravenous ACTH with some improvement, but by 23 February 1955 she had become so ill from exfoliative dermatitis that her INH was discontinued. She was then transferred to Fitzsimons Army Hospital.

On admission, she had a severe exfoliative dermatitis involving the entire body surface, generalized lymphadenopathy, and tender enlarged liver, two fingerbreadths below the costal margin.

Initial hemogram revealed a white blood cell count of 9,900, with 34% neutrophils, 53% lymphocytes, 4% monocytes, and 9% eosinophils; hemoglobin, 13.3 gm.; hematocrit, 42%; and sedimentation rate corrected to 9 mm. per hour. Initial urinalysis was negative.

She was treated with medicated baths, soothing lotions and antihistamines. The eruption cleared over a period of one week with the exception of mild exfoliation. On 15 March 1955, she was given 300 mg. of INH and within 18 hours had developed edema of the hands, arthralgia, temperature elevation to 102°F, and a distinct flare of her eruption. On 23 March 1955, therapy with cortisone was instituted in a dosage of 200 mg. daily with rapid subsidence of symptoms. On 29 March 1955, she was given 50 mg. of dihydrostreptomycin intramuscularly, with a flare of her exfoliative dermatitis, generalized adenopathy, and elevated temperature within 24 hours. Hyposensitization with dihydrostreptomycin was instituted beginning with a dosage of 5 mg. daily, and by 8 April 1955, the dosage had reached 100 mg. daily. On this date, a severe exacerbation of her skin rash developed. Cortisone was then started at 300 mg. daily, and by 14 April 1955, it was decided that the streptomycin must be discontinued. Steroid therapy was gradually withdrawn and within three days of its withdrawal her drug eruption recurred. Since her tuberculosis was so severe, it was finally decided that antituberculous therapy should be administered in conjunction with cortisone. After four days of concurrent therapy with cortisone, PAS, and dihydrostreptomycin, she again developed fever, chills, and more severe exfoliation. In May 1955, an attempt was made to hyposensitize the patient to INH, but after six days of therapy with extremely small doses of the drug, she again flared and it was decided that neither PAS nor INH could be tolerated despite the high steroid coverage. Cavitary disease was still present, and her sputum was positive for acid-fast bacilli (Figure 6). INH and PAS were permanently discontinued and she was placed on dihydrostreptomycin, 1 gm. daily; cortisone, 200 mg. daily; and viomycin, 2 gm. every three days. These drugs were continued and cortisone gradually reduced until it was found that she required 60 to 75 mg. of cortisone daily in order to continue with the streptomycin and viomycin therapy. In August 1955, her cavitary tuberculosis had become more severe, and there had been extension of the cavity in the right upper lobe. By September 1955, she had developed

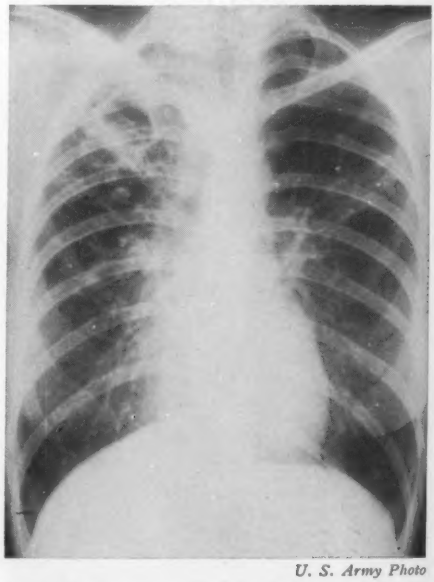

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FIG. 6. Chest roentgenogram showing cavitary tuberculosis in the right upper lobe. The patient was by now sensitive to all antituberculosis drugs and was still sputum-positive.

secondary effects from the prolonged steroid therapy with a moon face, fluid retention, generalized osteoporosis, and compression fracture of T-8. During the time of her cortisone therapy, she had been receiving supplementary potassium, a low salt diet, and the serum electrolytes had been maintained at a normal level. Prednisone, 15 mg. daily, was substituted for the cortisone and a Taylor brace was utilized for her back problem. In late November 1955, after five and one-half months of dihydrostreptomycin, viomycin, and steroid therapy, it was felt that thoracoplasty should be undertaken to close the right upper lobe cavity which was presumed to be the source of the patient's positive cultures. On 14 December 1955, a thoracoplasty was performed without immediate complications. In January 1956, and again in February 1956, she developed deep incisional abscesses with marked systemic effects. These abscesses responded to incision and drainage. By March 1956, she had developed bacteriological resistance to viomycin and dihydrostreptomycin. An attempt was made to withdraw steroids using ACTH stimulation, but there was much difficulty with exfoliation, arthralgia, and adenopathy. Finally by May 1956, steroids had been entirely stopped.

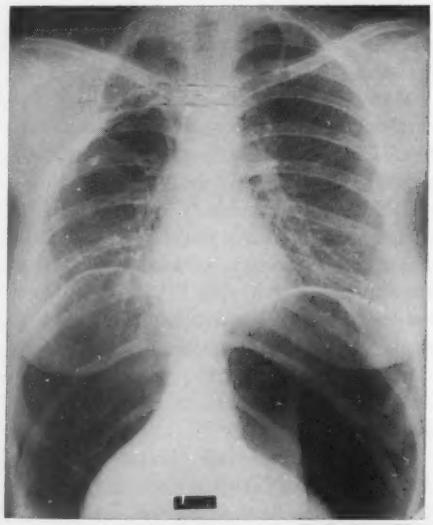

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FIG. 7. Roentgenogram of the chest showing right thoracoplasty and absence of cavitary disease, two years and seven months after the institution of therapy.

Because of the persistent cavities and her severe sensitivity to antituberculous drugs, it was decided that pneumoperitoneum should be utilized. This was begun on 16 August 1956 and maintained throughout the course of her hospitalization which ended on 4 September 1957. By July 1957, a total of seventeen weekly sputum cultures had been negative for acid-fast bacilli. Laminagraphic evaluation in August 1957 revealed no evidence of cavitary disease (Figure 7). She was discharged to be maintained on pneumoperitoneum for an indefinite period.

Sensitivity Reactions to Para-Aminosalicylic Acid

The fact that para-aminosalicylic acid has a tuberculostatic effect was based on the findings of Bernheim (1940-41) that benzoic and salicylic acids increase the oxygen consumption of tubercle bacilli.[1] The drug was introduced in Sweden as an antituberculous drug in 1946 by Lehman and has been widely used since 1948 as one of the mainstays of therapy. As with most drugs, undesirable side effects became manifest with its widespread use. It is difficult to determine the true incidence of such reactions. Percentages as high as 4.7[2] and as low as 0.28[3] have been reported. Compilation of data from various reports suggests an average figure of 2% to 3%.[4–11] Matsaniotis, Jacobs and Smith[12] described four cases of hypersensitivity reactions in children associated with para-aminosalicylate therapy, their percentage of reactions in 100 cases treated being 3.3%. Kierland and Carr[8] in 1949 described three cases of dermatitis medicamentosa and one case of fixed drug eruption resulting from PAS therapy. Cuthbert[13] reported a case of acquired sensitivity to PAS manifested by fever, exfoliative dermatitis, lymphadenopathy, albuminuria, oliguria, and jaundice. Warring and Howlett[9] tabulated the allergic

reactions to PAS as follows: headache, a syndrome characterized by burning of the eyes, lacrimation, and conjunctival injection, transient lymphadenopathy, angioneurotic edema with laryngeal edema, symptoms similar to anaphylactic shock, spasmodic coughing and wheezing, granulopenia, jaundice, a reaction resembling infectious mononucleosis, and a case of eosinophilic pneumonitis (Loffler's syndrome). Other authors[14–17] reported isolated reactions similar to the ones already listed. Korst[18] reported one case of bullous eruption of the glans penis due to therapy with PAS.

Shatin[19] and his associates told of five cases presenting lichen planus-like eruptions due to PAS. Julian[20] describes Cayley's report of a case of cardiac irregularity and paralysis due to potassium deficiency as a result of PAS therapy. Jeffery, Barrie and MacDonald[21] advise in their paper that in an individual on PAS therapy any unexpected rise in temperature during the period of three to four weeks after beginning of therapy is usually a sign of impending reaction to the drug. From the above, it can be seen that the spectrum of the manifestations of acquired sensitivity to PAS is extremely wide. Occasionally, a fever may be the only symptom. However, the most common clinical picture is characterized by an elevated temperature and an eruption of the skin which usually precede other manifestations. The onset of fever is generally acute and its height and duration vary considerably with the rate of elimination of the drug. A premonitory macular rash of very short duration (one to two hours) rarely precedes the main rash by one to three days.[22,23] The eruption is most often maculopapular, but may also show urticarial, vesicular, and purpuric lesions. Pruritus of varying intensity is generally present. Cases of severe exfoliative dermatitis have been reported.[24] The fever and skin eruption are often accompanied by headache, chills, malaise, anorexia, conjunctivitis, and generalized lympadenopathy. Our cases were good examples of such reactions.

Hematologic findings during the acute phase of the reaction vary considerably: neutrophilic leukocytosis, neutropenia, eosinophilia, and lymphocytosis have been reported. A detailed study on this subject was published by Cannemeyer, Thompson and Lichtenstein.[8] Our first case showed a marked and sustained eosinophilic response, but the second case exhibited a response no higher than 9% eosinophils.

Characteristic of every hypersensitivity reaction is a certain incubation period. The earliest reaction attributed to PAS has been eight days[11] and the latest 73 days[25] after the initiation of therapy. The majority of cases occur between the second and sixth week of therapy. Our first case developed sensitivity signs 34 days after the institution of antituberculous therapy and the second case 18 days after chemotherapy.

Since the diagnosis of drug fever is rarely easy and since neither the cutaneous manifestation nor the hematologic pictures are typical, the diagnosis of hypersensitivity reactions to PAS can be made only if one keeps in mind the possibility of its occurrence, the characteristic incubation period, and the particular manifestations to be expected.

Many other systems and organs have been involved in hypersensitivity reactions to PAS. Among these are swelling of the lips, parotid, and submaxillary glands, stomatitis, vomiting, and diarrhea;[9,24,26] angioneurotic edema with edema of the larynx, laryngeal stridor, violent cough, asthmatic attacks, and eosinophilic pneumonitis;[9,14,25,27–30] abdominal tenderness, albuminuria, cylindruria, oliguria, and transient anuria;[13,21,31,32] temporary alopecia, tinnitus, paresthesis, confusion, stupor, stiffness of the neck, stiff joints, and myalgia.[9,16,18,33,34]

When the resulting clinical picture of PAS sensitivity involves primarily the liver, the result may be very serious. Bellamy and associates,[15] in reviewing the literature, found that in 24 of 27 cases of jaundice due to PAS, the onset of prodromal fever came at least three weeks after PAS therapy was

started and that in the majority the dermatitis appeared a few days after the onset of fever. Eosinophilia occurred in 17 of the 27 cases reported. They reported a fatal case of hepatitis due to PAS occurring in a 23-year-old female with miliary tuberculosis and a tuberculoma of the brain, whose reaction began with fever 23 days after chemotherapy with streptomycin, isoniazid and PAS was started. Another fatal case of hepatitis in a patient taking PAS was reported by Allen, Beacham and Keschner[35] in 1953. Their patient's fever developed on the twenty-sixth day of PAS therapy and the skin eruption on the twenty-ninth day. Hansen and Cleve[36] reported a case of fatal toxic liver necrosis in a 22-year-old Negro who developed high fever, rash, conjunctivitis, lymphadenopathy, and eosinophilic fifteen days after streptomycin and PAS therapy was begun. Deaths from PAS hypersensitivity but without jaundice have also been reported.[24,37] Desensitization to PAS has been accomplished by using ascending doses of the drug after starting with very small doses. Some authors have been very successful in this endeavor; whereas, others have not been so enthusiastic. The program of desensitization chosen for patients is, at the present time, arbitrary and varies considerably among numerous reports. Apparently, satisfactory schedules are outlined by Hayes and Weiss[11] and Sandler.[28] In our first patient, we did not attempt desensitization to PAS since liver disease was severe; and in our second patient, we were not successful, even with the use of steroid therapy as cover. Francis and Gupta[38] in 1958 described four cases of hypersensitivity to PAS which were confirmed by intradermal and oral tests. They described a rapid method of desensitization using corticotrophin in which satisfactory results were obtained after treatment for less than one week. Further experience with this method of desensitization will be necessary before this method is firmly established. Some authors feel that it is extremely hazardous to attempt desensitization after hepatotoxic effects have been noted, and with this, we are in agreement. Paine,[39] in reporting a case of fatal hepatic necrosis due to PAS, concludes that test doses of PAS, unless minute, are dangerous and that, considering the potential seriousness of PAS hepatitis, desensitization is hazardous.

Isoniazid Sensitivity Reactions

Isoniazid, the hydrazide of isonicotinic acid, is, in the opinion of many, perhaps the most effective drug used in antituberculous chemotherapy. The toxic reactions from isoniazid therapy are infrequent in therapeutic ranges. The frequency of reactions is related to the dose level, being only 1% at 3 mg. per kilogram of body weight per day, and rising to over 15% at dose levels of 10 mg. or more per kilogram per day.[1]

In 1952, Fisher and his associates[40] reviewed the side effects seen in 232 patients on isoniazid therapy, and it was their opinion that the side effects noted were due to stimulation of the sympathetic nervous system. Such reactions included dryness of the mouth, constipation, delay in starting micturition, numbness and tingling in the fingers and toes, coldness of the hands and feet, cramps, twitching and weakness of the legs, and tremors in the arms, feet, and legs. Beneficial side effects such as decrease in the amount of sputum production and night sweats were explained on the same basis.

Hunter[41] reported a case of toxic confusional psychosis which developed after one month of isoniazid therapy in a dosage range of 8 to 10 mg. per kilogram of body weight. Wiedorn and Ervin[42] reported five cases of toxic psychosis in patients receiving isoniazid or iproniazid in the usual therapeutic ranges who improved after withdrawal of therapy. Two types of untoward reactions to isoniazid are well known.[43–45] The more common type is a toxic reaction, examples of which are peripheral neuritis and convulsions. The less comon type is the allergic reaction,[46,47] examples of which are drug fever, hepatitis, allergic pneumonia, and various types of dermatitis. Most physicians treating tuberculosis feel that isoniazid sen-

sitivity is a rare occurrence. Mann[48] comments on its rarity and states that he has treated more than 500 patients with the drug without noting allergic manifestations except in one case. Brown, Goldstein and Chapman[49] reported two cases of serious allergy to isoniazid. Both patients were immunized successfully, and it was their opinion that allergy to isoniazid in hospitalized tuberculous patients does not necessarily preclude its use. They felt that immunization should at least be attempted in order not to deny this valuable drug to tuberculous patients.

Acquired Sensitivities to a Combination of Antituberculous Drugs

During the latter part of 1952, several articles relating to the simultaneous development of sensitivity to PAS and streptomycin were published in the British Medical Journal.[20, 21, 50, 51] The cases described were the first of this nature to be reported. MacPherson in 1957 reported on two patients who proved, more or less simultaneously, hypersensitive to PAS and isoniazid, and possibly also to streptomycin. Suggestive evidence exists that a patient who has become sensitive to PAS is particularly prone to develop hypersensitivity phenomena when other drugs are administered. Accordingly, in a sensitivity case associated with combined therapy, one is no longer justified in assuming that a single drug is responsible. All drug therapy should be discontinued and a test dose of each drug given. In our second case, severe reactions occurred to isoniazid, PAS, and streptomycin, despite the fact that the patient was covered with steroid therapy.

Matsaniotis and his associates,[12] in their excellent article on drug sensitivity, particularly to PAS, offer some practical conclusions which follow and which we are in agreement. In patients receiving PAS, at the onset of fever or any unusual symptoms occurring within two months of the start of treatment, drug sensitivity should be considered the diagnosis until proven otherwise. As soon as the diagnosis is suspected, administration of the drug should be discontinued. It is common experience that the more severe reactions occur when the administration of PAS is continued in the presence of symptoms of hypersensitivity. It is difficult to know whether to continue the administration of other antibiotics in the presence of hypersensitivity reactions to PAS. Probably, this should be avoided in most cases during the acute phase of the reaction lest hypersensitivity develop to these drugs. Desensitization should be attempted unless specific contraindication exists. Since jaundice may occur as long as three weeks after the initial manifestation of hypersensitivity, it would seem wise not to undertake this procedure sooner.

Summary

Two cases of untoward reactions to chemotherapy occurring in cases of pulmonary tuberculosis are described. The first case showed severe sensitivity to PAS and probably to streptomycin or perhaps cycloserine, and hyposensitization was not attempted. In the second case, there was sensitivity originally to PAS and later to INH, with subsequent sensitivity due to streptomycin; however, streptomycin sensitivity was controlled by hyposensitization. Severe liver involvement occurred in both cases. In both cases, the drug sensitivity interfered markedly with therapy for tuberculosis but eventually satisfactory results were obtained.

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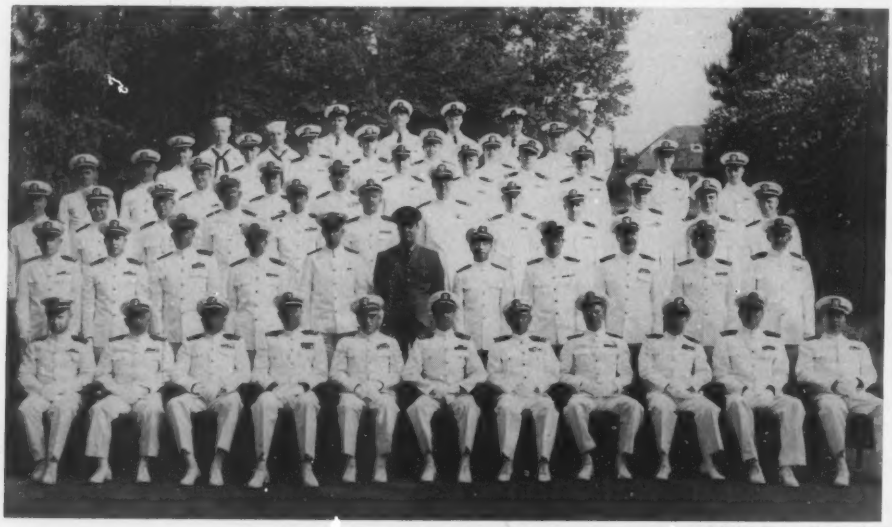
GRADUATES OF THE U. S. NAVAL SCHOOL OF HOSPITAL ADMINISTRATION, NATIONAL NAVAL MEDICAL CENTER, BETHESDA, MARYLAND, JUNE 23, 1960



Official Photo U. S. Navy

Forty-one students of the U. S. Naval School of Hospital Administration completed the ten-month course and received certificates of graduation from the Surgeon General, Rear Admiral B. W. Hogan on June 23. The class was composed of 38 Navy Medical Service Corps Officers, one Royal Canadian Air Force Officer, one Royal Canadian Naval Officer, and one Republic of Korea Naval Officer. Lieutenant Chester A. DeCesaris, MSC, USN, received the Surgeon General's annual award for scholastic achievement.

Vice Admiral Oswald Colclough, USN (Ret.), Acting President and Dean of Faculties, The George Washington University, Washington, D.C., gave the graduation address. The Class Charge was given by Captain Leo J. Elsasser, MSC, USN, Chief, Medical Service Corps.

The Dental Research Program in a Veterans Administration Hospital*

By

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ANY disease which has the universal prevalence of dental caries and periodontal disease must be a fertile field for research. In common with many other chronic diseases such as mental, neoplastic, degenerative diseases, dental ailments have been very resistant to preventive measures. Only through research in the clinic and in the laboratory can we help, control and minimize the ravages that occur in the oral cavity. The control, prevention and the amelioration of these two of the most common diseases of mankind is in part the responsibility of those of us working in the clinic.

The Veterans Administration directives[1] charge us with the responsibility. Let me quote from M-3, Part 1:

"1.02 PRINCIPLES AND OBJECTIVES OF THE MEDICAL RESEARCH PROGRAM

a. The mission of the Department of Medicine and Surgery of the VA is to provide the best available medical care for eligible veterans.

b. Research in VA hospitals and clinics is necessary because the best care is found in institutions where studies of the cause, prevention, and treatment of disease are conducted. The veteran benefits both directly and indirectly by research programs in VA Hospitals. He profits directly by the development of better methods of diagnosis, treatment, and rehabilitation. He also benefits directly because the opportunity for research attracts and retains better qualified professional staffs and permits them to improve their professional proficiency. The veteran and the public benefit indirectly by shortened periods of hospitalization, better rehabilitation, and consequent improvement in earning capacity, as well as by the cooperation of VA investigators with other Government and private agencies having interests in the health and welfare of the Nation.

c. The establishment of Deans Committee and the close affiliation between medical and dental schools and VA hospitals have been most important factors in achieving the present high standards in VA hospitals. Clearly this relationship was established to help the VA achieve its objectives. This will be best attained when the relationship is mutually beneficial to the VA and to the medical and dental schools.

d. Research opportunities should be provided in all VA hospitals where there are interested and dedicated professional staffs qualified to undertake the studies they propose. By this qualification the larger programs will usually be in the hospitals closely associated with medical schools. Residents, when qualified, are encouraged to engage in medical or dental research.

e. In general, the more directly a project can be expected to benefit the veteran-patient, the higher priority it will have for support. In applying this principle, the research program in a particular station must not be weakened by the arbitrary avoidance of sound projects in basic research. When basic studies can be included, the program generally will attain the completeness desired.

f. The opportunities to engage in research

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* Summary of a presentation made at the Area Dental Educational Conference held at Veterans Administration Hospital, Castle Point, New York, November 18, 19, 20, 1959.

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in the VA compare favorably with those afforded in most university hospitals in the country. The opportunity shall be extended, where possible, to all who are interested, from chief of service to junior resident. There is no age nor rank that should not be encouraged to think independently."

"1.03 POLICY

a. Professional staff members are encouraged to engage in medical research because such activities not only do not interfere with but actually complement their duties in the medical care of the veteran-patient; provided that nothing be done which is inconsistent with the best interest of the veteran-patient."

The VA regulation actually places the Chief of the Dental Service on the Research Committee. I quote from M-3, Part II, Program 1.07 e(2):

"*Membership and Organization.* This committee shall consist of the chiefs of the major professional services, such as medicine, surgery, dentistry, laboratory, radiology, psychiatry, radioisotopes, and at least two members or representatives of the Deans Committee."

Approach to Research

The approach to dental research may be a clinical evaluation or a laboratory study. All of us are fully prepared to conduct clinical evaluations in our own dental services. Laboratory studies are a bit more difficult in nature since they may require space, trained personnel and perhaps funds. Clinical evaluations and laboratory studies should be brought closer together with more clinicians research minded and conversely more research workers clinically minded. The VA Dental Services are a fertile field for such a relation because of the proximity of the other services in the Department of Medicine and Surgery.

Dental research in VA clinics can be a simple undertaking or a rather complex project. Let me give examples of a simple research project that can be easily performed in a VA clinic. This type of project falls into the class of clinical testing of new drugs to evaluate their effectiveness. Obviously, the proper method of doing this is the double blind technique, that is, neither the operator nor the patient knows whether he is using a placebo or a new drug. A third person does the tallying after the observations have been recorded. The results of such studies are often very revealing and you will find that the members of your staff who have participated will be quite enthusiastic. At the VA Hospital, New York, we run such a project each year as a teaching exercise so that the interns and residents can become familiar with double blind method of drug evaluation.

Let me illustrate a case in point. About three years ago the Schering Corporation came out with Meticorten and Meticortelone which are synethesized corticosteroids used in the treatment of a host of systemic diseases of infectious, inflammatory or allergic nature. The Corporation claimed that the action of the drugs is to control the exudative and inflammatory process. In short they were anti-inflammatory. The Director of Research of the Schering Corporation asked whether we would conduct a study to test the efficiency of corticosteroids in the control of swelling following such operative procedures as extraction of tooth, periodontal surgery, etc.

The project was written up so that the Hospital Research Committee could act on it. Approval was granted and the project was conducted utilizing the double blind technique. The results showed no dramatic diminution of edema, trismus or inflammation between the drugs and the placebos. The results of this study were published in the *Journal of Dental Medicine,* July 1959.[2]

Apart from learning the value of the use of corticosteroids in the control inflammation, the study made a great impact on the thinking of the staff and the residents. By carrying out the double blind technique, opinions as to the efficacy of the drug were replaced by fact. It was a stimulating and rewarding experience to the staff and personal

satisfaction to them, in that a paper was published by the participating interns, residents and staff dentists.

At a later date Johnson & Johnson came out with Surgicel. This is a little pledget of specially treated cotton which is placed in a socket to control hemorrhage. Since the material can be easily identified, it was difficult to utilize the double blind technique. However, to evaluate it fairly, Surgicel and existing hemostatic agents were used on the same teeth on either side of the mouth. After conducting this study we found this hemostatic agent is more effective than any presently on the market. This paper has just been completed and will be published shortly under the names of those who participated.

One more example of a simple clinical drug testing project is one that the New York Veterans Administration Hospital has just started. The Burroughs Wellcome Company has two new drugs, Neosporin and Cortisporin, to be used as an ointment for the treatment of ulcerative lesions. In order to evaluate this new product in the oral cavity, the Burroughs Wellcome people prepared two batches of each product. One was a drug as marketed and the other a placebo. These were put in tubes with no identifying marks that would cause a clinician to suspect which drug he was using. We are presently evaluating the efficacy of this new drug.

These illustrations are given to show simple clinical drug testing which may be accomplished in any VA clinic without additional staff, without additional space, and without additional funds. Conducting these projects is stimulating to the staff and makes for a rich professional career.

Statistical Studies

Another group of studies that may easily be undertaken in the dental service are the statistical studies. Available in the Veterans Administration Hospital and Regional Office clinic are vast numbers of records and roentgenograms that could be used for compilation, projection and interpretation. A word of caution may be in order! Before starting a statistical study, secure the advice of a statistician; and in Veterans Administration Hospital and Regional Offices, the psychologists generally have one of their members well trained in this field. Unless this is done, you may be gathering too many worthless figures or drawing improper conclusions.

Such a project was undertaken in our clinic by two postgraduate students at New York University who wanted to know the effect of systemic disease on the periodontal structures. As you know, systemic illness and emotional illness are stressors that have been implicated in the causation of periodontal disease. In this study we were concerned with evaluation of these stressors on alveolar bone.

Roentgenograms of 169 male patients in the New York Veterans Administration Hospital were examined in a blind study. These ranged in ages from 20 to 49 years and represented patients who were classified into a medical study group, a neuro-psychiatric group and a control group of hemorrhoids, fractures, etc., which could not be expected to affect the alveolar bone. Mesial and distal surfaces of selected teeth were studied as to the presence or absence of a visible lamina dura and the presence or absence of slow resorption. In addition, the ratio of the remaining alveolar crest to the root length was studied. All these scores were averaged for each patient, age group and diagnostic grouping and the findings compared.

The results of this study were published in the *Journal of Periodontology* in January 1958.[3] It was found that:

"1. The medical group had an alveolar bone loss similar to the control group. Both groups showed the same significant bone loss with increasing age.

2. The alveolar bone scores of the neuropsychiatric group did not decrease with age as much as the medical or control group.

3. The visible lamina dura decreased with age and not with diagnostic grouping.

4. The amount of slow resorption in-

creased with age and not with diagnostic grouping."

Osteogenic Research

Again, in our own clinic an ambitious project was undertaken three years ago. This pertained to the Squibb product "Osteogen." This is homogenized animal bone powder which Squibb has developed and which the orthopedic surgeons had been using to regenerate bone. We wanted to know whether this product could be used in, let us say, an infra bony pocket in periodontal disease. In order to have histologic evidence as to whether Osteogen does stimulate bone production or not, animal studies would be required. Accordingly, two of the residents undertook the project in conjunction with the Guggenheim Institute of Dental Research, where dogs may be housed in suitable animal quarters. At the Institute, the dogs were given a general anesthetic, the lesion resembling periodontal disease was created and the homogenized bone powder inserted. On the opposite side of the mandible a similar lesion was produced but no bone powder inserted. X-rays were taken at intervals and at a later date the dogs were sacrificed at various intervals. The Squibb Corporation was so pleased with the study that when the residencies were completed, these young men received a two year research grant to continue their studies, at a salary, at the Guggenheim Institute of Dental Research.

Complex Methods

There are occasions when problems present themselves that require more complex methods of research. When the new ultrasonic equipment was introduced, the question was raised as to whether there occurred pulpal damage caused by heat. Obviously, a project of this nature required laboratory animals which would have to be sacrificed following the use of ultrasonic equipment. To conduct this research, a combined project with the New York University College of Dentistry was undertaken. The dog is most suitable for this type of study and at the Guggenheim Institute of Dental Research suitable animal quarters were allotted for the study.

"Ultrasonic cavitation devices of the impactor type known to industry and extreme high frequency ultrasonic vibrations through air, water or tissue are known to produce, by violent molecular agitation, considerable quantities of heat. A set of studies was therefore outlined with the ultrasonic dental cutting machine (Cavitron Corporation) to determine the extent of generation when the device is employed clinically. Because of the possibility of vibratory resonance in tissue, and because of a report of considerable heat generation produced at a site quite distant from the point of actual application of the abrading tip, it was planned to accumulate data concerning possibly bizarre thermal effects across fluid phase boundaries in dental structures."

The results of this study were published in the *New York State Dental Journal*, March 1957.[4] It was found that thermogenesis with ultrasonic cavity preparation seems correlated with the size of the tooth cut in a directly linear manner. Heat rise within the tooth (measured intrapulpally) seems to be a direct heat wave transmission spreading through the substance of the tooth centripetally from the point of force application."

Questions raised by this study naturally led to another study and you will find that this is a common occurrence. What is the effect of ultrasonic cutting tools on the pulp of permanent erupted teeth and unerupted teeth? The need to assay the use of ultrasonics led also to re-evaluate the effect of trauma by conventional rotary cutting instruments on the teeth since these were used as a control. In this histopathologic study the Rhesus monkey was used and, again, the Guggenheim Institute for Dental Research jointly with VA personnel undertook study of the problem.

The results as published in the *Journal of the American Dental Association*, July 1959,[5] were that "the response in the pulp was mild and generally indicated a reversible reaction

in all aspects comparable to response caused by rotary preparation. No evidence was found of any demonstrable pathologic condition in the supporting structures, nor was aberration or dysplasia seen in growing structures or tissues."

Aging Process Research

Another example of a joint research project between the Guggenheim Institute of Dental Research and the VA is as follows. This one, which is about to begin, has received National Institute of Health, U. S. Public Health Service support. This is a project to determine whether the aging process is demonstrable in connective tissue by gingival biopsies. In order to determine this, 100 cases of patients with chronic systemic diseases, and 100 cases of healthy individuals will have a biopsy of the gingival tissues taken. These biopsies will be taken when a tooth has to be extracted, at which time a small piece of tissue interproximally will be removed. This will be fixed, the connective tissue specially stained and studied microscopically. Perhaps in a year from now I can report on this study.

Other Problems

Not always does a research project bear fruit. Where negative results are obtained, there may be a feeling of futility. We have just completed such a project. It was to investigate changes in the oral cytology in cigarette smokers, who have stopped smoking. Twelve heavy cigarettes smokers had exfoliative cytology smears taken, then again when they stopped smoking, and again when they resumed smoking. The results were all the same. We could find no oral exfoliative cytology changes in smokers and non smokers.

At times, necessity will dictate a research problem. After anticoagulants were introduced, patients were carried on dicumerol for months and years. Could a tooth be extracted on patients on therapeutic levels of anticoagulant without the danger of the patient bleeding to death? Search of the literature revealed an article by Aspey and Cherry in California stating that 6 patients on anticoagulants had 14 teeth extracted with no hemorrhage. We questioned the authenticity of this paper for if dicumerol was effective as an anticoagulant, then hemorrhage should result.

A joint project with the Medical Service of the Hospital was set up. Patients undergoing therapeutic dicumerol therapy on the medical wards were referred to dental for necessary extractions of teeth with carious pulp exposure. So serious was the blood loss from simple extraction that in one case, after 4 days of oozing, the patient was taken off dicumerol and given menadione; only then did the bleeding stop. In the second case, after 5 days of oozing, the hemoglobin had dropped from 14.0 to 7.1 gm for 100 ml. The patient was given an intravenous injection of 50 mg. of menadione and a transfusion of 500 ml of whole blood. While the patient was off dicumerol and after the prothrombin time had returned to normal, another carious tooth was extracted with no excessive bleeding. On the basis of these experiences no further teeth were extracted in patients on therapeutic levels of dicumerol. These results were published in the *New England Journal of Medicine,* February 21, 1957[6] and in the *Journal of Oral Surgery, Oral Medicine and Oral Pathology,* May 1958.[7]

Periodontal Disease Problem

As mentioned before, the loss of teeth through periodontal disease is appalling. More teeth are lost because of breakdown in the periodontium than in any other disease process. The paucity of productive research in this field is disturbing. However, there is an ever increasing body of evidence that points to local and systemic factors that alter the physiological tone of the oral tissues, allowing oral organisms, which are normally innocuous, to invade and destroy the periodontium. It is necessary to explore with greater success the fundamental processes that govern the activities of living tissues, and in particular oral tissues, by in-

vestigating the processes in an intra and inter cellular chemical basis.

It is here that research can be undertaken jointly in the Veterans Administration clinic with basic science and laboratory studies in conjunction with other departments of the hospital or, perhaps, even other institutions. Such joint projects which may involve not only dentists, but M.D.'s and Ph.D.'s, is to be encouraged. It becomes increasingly clear that the histologic lesion we see under the microscope is preceded by a chemical lesion at the cellular level. It may be the breakdown in the enzymatic pattern in the cells that develop into the periodontal lesion. How the endogenous and exogenous factors affect the periodontal structures may be dependent upon a closer understanding of enzymatic action, on metabolic patterns. Such research may at times become involved. But these cooperative studies with biochemists, pathologists and others trained in animal research, can be very rewarding to full professional careers in the Veterans Administration. In our clinics we may furnish materials so that studies of a histochemistry, cellular physiology, biochemistry, biophysiology may be undertaken by others trained in these disciplines. Dental research has advanced to the point when joint projects by groups or teams becomes mandatory.

Dr. John E. Fauber, Assistant Chief Medical Director for Dentistry has stated succinctly the VA attitude toward dental research.[8] "The great amount of clinical material in VA hospital creates a unique opportunity for individual and cooperative research in the oral cavity and its relation to the total man." "In keeping with the philosophy that an educational and research program is necessary in any health endeavor to increase its efficiency and promote its professional growth, VA Dental Services provide generous opportunities for its staffs."

Summary

Let me summarize:

1. VA manuals not only encourage research, but state that the best medical and dental care is found in hospitals engaged in research.

2. The Chief of Dental Service has been placed on the research committee along with other major services.

3. Examples were given of simple research projects involving no additional funds, no additional space, and no additional personnel that can be undertaken in any VA clinic.

4. The VA is a fertile field for statistical studies and these can be undertaken in the Dental Service with ease.

5. Examples of Joint Cooperative Studies with other institutions or universities were given.

6. Examples of Joint Cooperative Studies within the VA hospital but with other services were given.

7. The need for further work is vast.

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Intestinal Protozoans and Helminths in the Indigenous Population and Employees Associated with a Naval Air Station in the Philippines*

By

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IN FULFILLING international commitments and agreements American military personnel and their dependents have taken up residence in many foreign countries. Movement of such peoples into new environments where they intermingle and have varying degrees of contact with indigenous populations poses certain medical problems. At times viral and bacterial diseases contracted in scattered geographic localities have been of considerable concern. Parasite infections, however, have been limited since most American personnel continue there western ways of living and insist on high standards of personal and household sanitation.

Since hundreds of Americans live in areas in which parasites commonly occur in native populations certain dangers continue to exist in spite of caution and well planned preventive measures. The possibility for infection by intestinal parasites is always present since numerous indigenous laborers, food handlers and general public servants are necessary for proper function and maintenance of most military and related activities in foreign lands.

During the fall of 1958 there was an apparent increase in the incidence of *Entamoeba histolytica* among personnel at the U. S. Naval Air Station, Cubi Point (Luzon), in the Republic of the Philippines. Consequently, a request was made for an epidemiologic study at the base and in the nearby city of Olongapo. Emphasis was therefore placed upon a survey of intestinal parasites to determine the potential infectivity of indigenous peoples who could serve as possible sources of infection.

MATERIALS AND METHODS

Since this survey was conducted to determine the possible sources of infection by *Entamoeba histolytica* and other intestinal microfauna in military personnel different categories of people were selected for study. These included individuals residing in the nearby city of Olongapo as well as employees at the naval air station. High school and college students were chosen to represent an average segment of the local population. Attention was directed to a study of food-handlers, waiters, hostesses and other employees in restaurants and in establishments of entertainment regularly patronized by U. S. service personnel while off duty. Similar groups of employees in galleys, snack bars and clubs were examined to learn whether indigenous personnel working on the base served as potential parasite carriers.

Stool specimens were obtained from the following sources:

Jackson High School, a public school with an enrollment of approximately 1500 students, ranging from 11 to 16 years of age. All economic levels of the local population were represented.

Naval Reservation Junior College, a school for the local populace with a total of approximately 770 students. Ages ranged from 11 to 19 years with only a few students in the upper age group. These students were considered as a representative group whose parents belonged to an eco-

* The opinions or assertions contained herein are the private ones of the authors and are not to be construed as reflecting the views of the Navy Department or the Department of Defense.

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nomic stratum slightly above the average for Olongapo.

Vendors, the sidewalk and market merchants who sell vegetables, fruits and meats to Americans as well as to the townspeople of Olongapo. These were adults of varying ages including farmers, fishermen and members of families from different localities in and near the city.

Foodhandlers, waitresses, hostesses, etc., young adults who cater to the local populace as well as to American service men. This group has varying degrees of contact with food and drinks consumed by the people eating in public restaurants, bars and night clubs.

Galley staff, young to middle age adults including both American and indigenous personnel. The latter group was in the majority. These employees were responsible for handling, general preparation and serving of food to military personnel on the base. Although working in a galley with the highest standards of sanitation, they have varying contact with food and eating utensils. The indigenous personnel, although required to have a physical examination prior to employment, come from a locality in which intestinal parasites are common.

Stools in sputum cups were collected from the different sources as soon as convenient and were fixed a few hours after passage. The merthiolate-iodine-formalin (MIF) (Sapero and Lawless, 1953) preservation method was employed. Several samples of feces, totaling approximately 1 gram, were taken from different areas of the stool and macerated well in a 15 ml screw cap vial containing 10 ml of MIF solution. Vials were sealed with paraffin and forwarded to the Taipei laboratory for processing.

Detection of intestinal protozoa and helminth eggs was based upon a thorough examination of a single direct smear preparation. A 10- to 15-minute search was made of a sample consisting of several drops (22 × 22 mm coverslip) drawn from the upper layer of sediment in each vial. Previous experience had shown that a sample taken from the upper stratum of particulate material represents a several fold concentration of microfauna by the sedimentation principle. Vials were allowed to stand undisturbed several hours prior to withdrawal of study sample.

Survey Findings and Discussion

Table 1 gives the incidence of intestinal protozoans and helminths detected in a study of stool specimens obtained during an epidemiologic study at Olongapo and the nearby U. S. Naval Air Station on Luzon (Philippines). It is obvious that intestinal parasites and associated microfauna prosper in this community where general conditions apparently are very favorable for their multiplication and transmission. This state of parasite utopianism poses a problem of real concern to United States military and allied personnel since the people from this community are employed in considerable numbers at the air station and infected persons in Olongapo have varying degrees of contact (food handling and otherwise) with American service personnel.

Several species of protozoans occur commonly in the group studied indicating, perhaps, a general laxness in personal and public sanitation. The high incidence for the amebas *Entamoeba histolytica, Entamoeba coli, Endolimax nana* and especially *Dientamoeba fragilis* suggest that an effective means for transmission exists in the community. While the rates of incidence seem high by western standards, they meet the expectations for this general geographic area. An incidence of 21 to 35 per cent for *E. histolytica* represents a well seeded population but the figures are comparable to those reported by Frick (1956) in his study of intestinal parasites in the Chinese and Taiwanese on Taiwan and by the senior author (Kuntz, 1960) in a recent survey made in East Pakistan.

The rates given for the common amebas, *E. histolytica, E. coli, E. nana* and *Iodamoeba bütschlii* are considerably lower than that recorded in similar surveys made in Egypt (Kuntz, et al., 1959). Records available from public health organizations in the

TABLE 1

INCIDENCE* OF PROTOZOA AND HELMINTHS IN INDIGENOUS PEOPLES OF OLONGAPO AND EMPLOYEES AT NAVAL AIR STATION

	Schools		Vendors	Food handlers, waiters, etc.	Galley Staff		Servants	
	High School	Junior College			Amer.	Indig.	Public	Private
Protozoa								
Entamoeba histolytica (LR only)	10	11	15	10	5	6	5	—
Entamoeba histolytica (SR only)	6	19	17	16	3	11	24	6
Entamoeba histolytica (LR & SR)	4	4	—	9	—	3	5	—
Total *E. histolytica*	20	34	32	35	8	20	34	6
Entamoeba coli	21	38	29	29	5	15	13	37
Endolimax nana	27	33	17	20	3	23	8	31
Iodamoeba bütschlii	2	4	2	—	—	5	—	—
Dientamoeba fragilis	10	2	7	2	—	1	—	—
Giardia lamblia	6	4	—	9	5	5	3	—
Chilomastix mesnili	—	—	—	—	3	2	—	—
Trichomonas hominis	2	2	2	—	—	—	—	—
Enteromonas hominis	15	11	7	7	3	6	5	—
Helminths								
Ascaris lumbricoides	81	69	51	23	3	18	42	31
Hookworm	13	15	7	18	—	15	5	—
Trichuris trichiura	54	63	63	20	—	35	39	25
Hymenolepis nana	—	—	2	—	—	—	—	—
Clonorchis sinensis	—	—	—	2	—	—	—	—
Schistosoma japonicum	—	—	2	2	—	1	—	—
Tyroglyphoid mite	—	2	—	—	—	3	—	—
Individuals with protozoa	46	65	66	65	20	52	53	56
Individuals with helminths	94	98	83	49	3	49	47	44
Number of specimens examined	48	52	41	68	40	185	38	16

* Percentage of incidence given as the nearest whole number.
LR = large race *E. histolytica* with cysts measuring more than 10$_u$.
SR = cysts less than 10$_u$.

Philippines cannot be used satisfactorily as a means of judging the findings in the present study. As in many tropical and subtropical countries reports on amebiasis are limited and data relating to dysenteries and other intestinal infections are lumped together with little regard for etiologic agents involved. As in our previous evaluations of *E. histolytica* the incidence for the large and supposedly nonpathogenic small races are listed separately. The small race is the predominant form in most categories of persons examined. This fact, although worthy of recognition, should not necessarily discredit the infection potentials among the Filipino population. Nonpathogenicity is not universally accepted as a fixed characteristic of the small race of *Entamoeba histolytica*. Furthermore, it must be realized that the rates recorded in Table 1 are based upon a study of a single stool specimen. Incidence for *E. histolytica* and other microfauna would have been elevated considerably had several stools been examined for each individual.

Ascaris is by far the most common hel-

minth present, followed closely by *Trichuris* and hookworm. It is assumed that both *Necator* and *Ancyclostoma* are represented. Only 2 per cent of the 52 junior college students escaped parasitism by helminths. These figures in general agree with those reported by Pesigan, et al., (1958) working in parts of the Philippines where 92 to 99 per cent of the population were found infected with one or more of these 3 nematodes. There is no satisfactory explanation for an absence of *Strongyloides* and *Trichostrongylus* in spite of the fact that a population sample of 448 persons was considered. The incidence for hookworm would suggest the probable occurrence of *Strongyloides* and the general conditions observed for the community along with an association of domestic animals would favor the finding of *Trichostrongylus*. An absence of *Enterobius* may be attributed to the fact that anal swabs were not employed in this study and there were no younger age children.

The incidence for *Hymenolepis nana* is very low for this type of community in which there seems to be an excellent means of transmission for other intestinal microfauna. There was a single infection with *Clonorchis sinensis* and 3 cases of *schistosomiasis japonica*. Eggs of the *Schistosoma japonicum* occurred in the stools of transient laborers who had come from Palo, Leyte to Olongapo.

Both protozoa and helminths are well represented. From the standpoint of potential danger to American personnel, the high rates of infection for *E. histolytica* are considered the most important. Certainly the incidence reported for this parasite in food handlers working on the base as well as for those in restaurants and establishments of entertainment in Olongapo is above that expected in a group of employees who come under the surveillance of military authorities. Persons in this category as a rule employ self treatment with available antibiotics to protect their positions and to comply with the standards set forth by local health authorities.

Although an apparent rise in the number of cases of amebiasis in American personnel prompted the present study, figures are not available to indicate the exact increase in percentages of infection. The incidence of *E. histolytica* in the peoples of the town as well as employees on the military base is a good indication as to the sources of infections. There are additional implications for which there are no critical evaluations. Personnel of the fleet are also exposed to the parasite infection hazards existent in Olongapo since large numbers of service men come ashore and have a contact with the indigenous population.

Infection rates of 20 and 34 per cent respectively among the indigenous galley staff and general public servants is somewhat above the accepted standards of safety in health conscious organizations. Even the American representatives on the galley staff harbored intestinal amebas, including *E. histolytica*, at higher rates greater than usually expected among military personnel (Kuntz, 1959). In this group of 40 persons, if one dare speculate, there is an indication that the variety and incidence of their intestinal microfauna may have been influenced by association with the indigenous members of the galley staff.

Interviews were conducted with a number of persons, including officials, to provide a better understanding of the parasitologic situation revealed by this study. A general physical examination is required of all indigenous applicants for positions on the military base. Investigation revealed that only limited attention was given to the recognition of parasite carriers among the employees. Stools from applicants were examined for helminths at a base laboratory with emphasis on a search for eggs of *Ascaris* hookworm and *Trichuris*. No attempt was made to recognize intestinal protozoans in spite of parasite transmission potentials indicated by the technicians. Tabulations showed that 53 per cent of approximately 1800 stools examined contained the eggs of at least one of these nematodes. It seems possible that this failure

to detect *E. histolytica* may have offered opportunity for amebic carriers to enter into the American community, contributing to the elevated incidence for amebiasis.

Since it was apparent that infections among U. S. military personnel were a reflection, in great part, to various relationships with the indigenous population, health authorities were also interviewed to obtain information concerning amebiasis and dysenteries among patients entering local health clinics and hospitals. The consensus of opinion, at least that offered, was that amebiasis is uncommon in Olongapo and only a few cases of dysentery due to amebic infection are recorded from several thousands of patients.

It was estimated that *E. histolytica* occurred in approximately 3 per cent of stool specimens examined each year. Technicians disclosed that amebas (some presumably *E. histolytica*) were detected each month but positive reports were given only for patients who had entered the clinic with intestinal ailments and clinical manifestations suggesting amebiasis.

There are several factors to consider to account for the low degree of parasitism and the limited number of cases of amebiasis reported by the officials of Olongapo. Two of these are of basic importance in evaluating the infection potential of the indigenous peoples and their relationships with the influx of American personnel. In this indigenous population there undoubtedly is an immunity or host-parasite tolerance which would tend to govern or minimize outright clinical amebiasis. Secondly, since the economic status of the city is closely associated with the presence of dollar-spending service men, it would be undesirable to reveal the potential parasite or other disease hazards.

The present epidemiologic study has revealed conditions which favor a certain degree of parasite transmission from a highly infected indigenous population to American military personnel and their dependents. This is not an isolated situation. Due to the benign nature of parasite diseases and failure to recognize such infections it is likely that comparable hazards exist at other military activities abroad. Fortunately, the majority of Americans although stationed temporarily in unusual environments continue to live by their western standards of sanitation. Consequently chances for parasite infection are held at a minimum.

Exposure to intestinal bacteria and parasites varies greatly in different areas and is dependent in part upon the eating habits of American personnel. A study of military personnel and their dependents on Taiwan (Kuntz, et al., 1959) has shown that the incidence of intestinal protozoa and helminths is not markedly increased as a result of residence among indigenous peoples in which parasites are common. Interviews with persons studied revealed that many use local fruits and vegetables but few consume salads or uncooked foods when eating in public restaurants or in the homes of local friends. A large percentage enjoyed Chinese foods regularly but it must be emphasized that the foods were well cooked and served steaming hot. Observations had indicated that such foods may at times be served under nonsanitary conditions by parasite carriers but it is believed that the foods were sufficiently hot to offer considerable protection in spite of the fact that contaminated utensils and plates were commonly used. Foods consumed by Americans in other countries where the methods of preparation may vary, i.e. served cold or slightly heated, may allow for greater opportunity for parasite transmission. Therefore, safety in consumption of foods in foreign environments is largely a matter of individual discretion.

A high incidence of parasitism is to be expected in the indigenous population and in the employees in some areas. Since it is not easy to control infections in these peoples there should be an awareness of infection potentials and preventive measures should be instituted in the interest of the welfare of American personnel. Obviously indigenous persons applying for positions on military bases and especially those destined to work

as foodhandlers should be given a pre-employment screening followed by examinations at regular intervals.

Summary

A study of single stool specimens from 448 indigenous persons, some of whom have varying degrees of contact with American military personnel at a Naval Air Station in the Philippines, revealed a high incidence of intestinal protozoans and helminths. The total incidence for *Entamoeba histolytica* ranged from 21 to 35 per cent in students, vendors and employees in public establishments (including restaurants) in the nearby city of Olongapo and 20 per cent of the indigenous galley staff on the military base were infected. Although the supposedly non-pathogenic small race of *E. histolytica* was predominant, the rates of incidence for all microfauna suggest the presence of parasite transmission hazards for American personnel.

Ascaris was the most common helminth (23-81 per cent) in peoples of Olongapo followed by *Trichuris* (20-63 per cent) and hookworm (7-18 per cent). *Hymenolepis nana* and *Clonorchis sinensis* occurred in each of two individuals and *Schistosoma japonicum* was detected in 3 persons from Leyte. An epidemiologic evaluation of parasite transmission potentials indicated that carriers associated with the American community may account for a reported increase of amebiasis in military personnel.

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Nutrition in Space*

By
COLONEL L. M. HURSH, MC, *U. S. Army*†

WHEN and if man travels for prolonged times in space or to other planets he will require the same life sustaining materials as he requires here on earth. I think it most unlikely that man will be able to adapt to any major change in nutrients, temperature, pressure, oxygen, carbon dioxide or anything else. Thus our problem is to provide the same environment in space as here on earth.

Recently there has been a great deal of interest in space and much more speculation. I shall be no different. Let as assume it is now sometime beyond 1960 and we are about to take one of three trips into space. The first trip to be a simple rocket flight to Peking, China of about 1 hour duration. The second, a trip to the moon and return without stopping, of one week duration, and the third a trip to the moon where we will remain for our 1 year overseas or more appropriately "over space" duty assignment.

THE SPACE TRIP FROM WASHINGTON, D.C., TO PEKING

This trip will be little different than flying from Washington to Chicago today. Depending upon the time of day and the courtesy of the "Space or Rocket Line" you may or may not have breakfast, lunch or dinner served. Let us for simplicity sake assure that it will *not* be served. You, therefore, depending upon your own appetites and desires, may have a snack prior to flight. However, it is likely that the "space line" will advise you to eat nothing 2 hours prior to "lift off." This precaution will be taken because in the weightless state some people have a tendency to become nauseated and vomit. As you all know, it is a bit trying to be riding next to such an individual on our regular flights of today. He or she never seem to be able to find that little bag for the first catastrophe and by the time they do find it there is little left in their stomachs for the bag to receive. Now this is mess enough in a gravity state and usually only the adjacent passenger is involved. Can you imagine what it would be like during a weightless state? The propulsive force of vomiting which separates this material from its owner will be great enough to distribute it throughout the length and breadth of the rocket. This, however, is not the most serious consequence. The originator in all likelihood will not be able to get rid of it entirely and may aspirate a considerable quantity into the lungs, shutting off his respiration and causing death.

The "Rocket or Space Line" will also advise you to attend to your bowels and bladder prior to flight. You all know it is a bit difficult to do this on our planes of today even if the weather is only a little rough. I will leave to your imagination the state of affairs such a maneuver would produce in a weightless state.

Thus, you can see that so long as one does not have to eat or drink, defecate, or urinate the trip will be quite a simple straight-forward experience and nutrition is no problem.

Let us now consider a trip of one week's duration, a joy ride to the moon and return.

This offers a few more difficulties but these are solvable with our present technology.

Oxygen. This can be provided with liquid oxygen and each adult will require about 2 pounds per day (0.77 kilo).[1] It can also be provided with super oxides of K.

Carbon Dioxide. If carbon dioxide is not removed from the atmosphere of the cabin it would shortly build up to concentrations which are toxic so that the atmosphere will not support life. This problem may be solved by using lithium oxide as an absorbent and 2

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pounds (.84 kilo)[2] will satisfy the requirement for one adult for one day.

Carbon Monoxide. This also acccumulates in a closed cabin under special circumstances and as you all know is toxic. It can be absorbed with a small amount of "Hopcalite" a commercial catalyst.[3]

Water. A minimum requirement will be 2,500 cc per day per man[4,5,6] which is about 5 pounds and will be provided in squeeze bottles. This plus the water of oxidation from his food will be adequate.

Food. This in all likelihood will be dehydrated and each adult will require at least one pound per day (2,000-2,500 cal). However if means within the space suit or capsule have not yet been developed for satisfactory defecation in the weightless state then another approach is desirable. The rocket line would then advise the space traveler to go on a diet of more or less purified food which leaves no residue. The Quartermaster Food and Container Institute in Chicago already have such a preparation in a high calorie, high protein, high fat chocolate drink. The space traveler would then start the diet four days prior to lift off, evacuate the gut just prior to lift off and remain on this diet during flight. Under these circumstances he would have no need to defecate for the entire trip and indeed could live comfortably for 2-3 weeks without defecating.

Thus one man's nutritional and metabolic requirements for one day will weigh a minimum of 10 pounds. For seven days this will be 70 pounds. Transportation costs for his requirements alone are 350,000 dollars when figured at a rate of 5,000 dollars per pound. Add to this the cost for the weight of a 170 pound man, 815,000 dollars and you have a total cost for one passenger of well over one million (1,165,000) dollars. I anticipate few travelers at this rate.

However ignoring the cost, we do today possess the capability for such a trip providing the hardware people can deliver the space capsule to its desired locations.

Now let us consider the poor fellow who has to serve a one-year tour of duty on the moon.

As indicated in the previous trip one can carry his own oxygen and carbon dioxide absorber at least for several months. He can also carry a lyophilization chamber which will freeze out the water from urine, feces, etc. for reuse and thus reduce the amount of water he needs to take along for a long trip. The thing he cannot carry with him is adequate amounts of food.

It is anticipated there will be no lack of energy either from the sun or from nuclear power packs. Thus our main problem is to convert this energy into a source of food which is acceptable and nutritionally adequate for man and to do this in the most economical manner. Attention has turned to unicellular organisms for this purpose.

A fully grown steer weighing ½ ton produces protein at a rate of 0.9 pound per day. duce 82 pounds of protein per day. One-half vested under optimum conditions would produce 82 pounds protein per day. One-half ton of yeast can synthesize 51 tons of protein per day.[7]

Algae have an even higher rate of growth.[2] They will not only produce an essentially adequate diet but will also provide oxygen and take up carbon dioxide. With such a system it should be possible to design a self-contained closed ecological system, a little earth within itself balanced between the astronaut and the algae, each using the other's bi-product. The problem with this system is to reduce it in size and weight where it would be practical on space ship, moon or satellite.

Present systems require 2.3 kilo of dried algae to provide the gaseous exchange for one man for one day.[8] To produce this it requires 200-230 liters[2-9] or a total volume of 80 cubic feet with 240 square feet of illuminated surface.[9] Thus an algae system plus 50 kilo for equipment will add another 500 pounds per man.[2] This then adds another 2½ million dollars to the trip for this one passenger. A total now of 3.6 million.

The amount of algae required for gaseous exchange is almost exactly that required for food.[3] Thus it is theoretically possible to balance the system. It has been stated previously however that the oxygen, carbon dioxide re-

quirements can be met in other ways; therefore, our interest in algae is primarily as a food.

By modifying the nutrient culture of algae one can produce algae containing 9% to 58% protein, 6% to 38% carbohydrate and 5% to 85% fat.[10] The usual composition is 50% protein, 25% fat, 16% carbohydrate and the balance is ash.[8] It contains adequate amounts of all of the essential amino acids except methionine.[11] Means for rapid drying must be developed[12] or many of the amino acids are lost. Some form of spray drying will probably prove most satisfactory.

Dr. Jack Myers[3] has demonstrated that diluted human urine will provide the necessary nitrogen for algae culture while producing little or no inhibition of growth. However, over a prolonged period of operation it is likely that such things as indole acetic acid will have to be removed from the urine as this is an inhibitor of photosynthesis. This is the substance in urine that causes the grass to lose its green color in the vicinity of the frequently used fire plug. Lyophilization of the urine is the best way of recycling the water. This water is then acceptable for drinking and the nitrogenous material can be used for growing algae.[13]

Algae are also high in some vitamins as well,[11] particularly vitamin A and C—5,000 IU of vitamin A per gram and 2-5 mg of vitamin C per gram.[14] Vitamins are not a critical problem as these can be added supplements to the diet. It may be necessary to destroy some of this vitamin A to prevent vitamin A intoxication.

Thus it would appear that algae are capable of supporting human nutrition but there are many many problems. Mice and rats have been maintained for short periods (2 weeks) on 100% algae. Humans have eaten them in concentrations of 1-10% in bread, ice cream, noodles, etc.[11] and they have been used in tea at a 20% level.[14] At these levels the food has a greenish color and an agreeable taste. The dried powder, per se, however, is accepted poorly due to its odor, flavor and color and is incompletely digested in both the gut of the rat and man as demonstrated with the electron microscope. Decolorization of the algae with methyl alcohol improves its acceptance and digestibility. Thus algae do have the potential of supporting human nutrition but problems of production, processing, incomplete digestibility and poor acceptability have yet to be overcome. In spite of these problems algae seem to hold the greatest promise for providing food for the space man at the present time.

Efforts do not stop here. There is work being done with hydroponics using volcanic ash, feces and urine. Others are exploring the use of rapidly growing animals such as rabbits and chickens which can be grown on algae. It is hoped that once a base is established these other systems can be added to round out a diet not too unfamiliar to that which we "earthlings" are now accustomed.

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EDITORIALS

General of the Armies John J. Pershing Centennial Day, September 13, 1960

THERE are still living over two million American veterans of World War I. While not all were in the American Expeditionary Force to France, headed by General John J. Pershing, all will remember that name.

One hundred years ago, September 13, 1860, that great American was born near Laclede, Missouri. He was appointed to the United States Military Academy in 1882 and upon his graduation in 1886 was commissioned a second lieutenant in the U. S. Cavalry, a branch of the Army which was colorful, active, and from which many generals were made.

Although he held the rank of temporary major for several years, he was jumped from his permanent rank of captain to the grade of brigadier general in 1906, being nominated to that grade by President Theodore Roosevelt.

There were many outstanding military assignments for this stern disciplinarian. He made them outstanding by the discipline of his own person. He will be remembered for his leadership in the Moro Campaign in the Philippines, for that in the Punitive Expedition on the Mexican Border in 1916, and above all for his remarkable courage and statesmanship against the French and English leaders who wanted to cut up the American Expeditionary Force to fill their ranks in World War I.

Pershing would have none of that, and being supported by President Woodrow Wilson, our forces remained intact and fought in heavy engagements. Pershing insisted in getting out of the trenches. Trench warfare of World War I was becoming a stalemate.

He became General of the Armies on September 3, 1919 by an Act of Congress. Then on July 1, 1921, he became Chief of Staff, the position he held until his retirement in 1924.

That date did not end his service to his country. Many jobs were to be thrust upon him and all he willingly did while physically able. He offered his services in World War II but at the time he was 81 years old. President Franklin D. Roosevelt said, "You are magnificent! Under a wise law, you have never been placed on the retired list. You are very much on the active list, and your services will be of great value."

Death came to this great man on July 5, 1948, at the age of 87. For twenty-four hours his body lay in state in the Capitol before burial in Arlington National Cemetery.

Remembering all these great things, President Eisenhower has declared September 13, 1960 as "General of the Armies John J. Pershing Centennial Day."

Cholera

IN THE spring issue of the *Wisconsin Magazine of History* (Vol. xliii, No. 3), published by the State Historical Society of Wisconsin (Madison) we read in an article, "Disease and Illness on the Wisconsin Frontier: Cholera," by Peter T. Harsted, that malaria and cholera were two troublesome and generally feared diseases among the settlers of Wisconsin.

Malaria gave prolonged illness; cholera, sudden death. The causes of these diseases were unknown at that time.

All kinds of remedies were used: Dr. Townsend's Sarsaparilla, Anti-Cholera Syrup, and the specially prepared metal con-

ductor which attracted the troublesome impurities from the air. These for the laymen who tried to circumvent the physicians with their remedies of calomel, laudanum, turpentine, and sulphur.

William Beaumont, Army physician at Fort Crawford, said, "The greater proportional number of deaths in cholera epidemics are . . . caused by fright and presentiment of death than from fatal tendency or violence of the disease." Editorial comment of the day echoed such belief. But fearless soldiers died anyway. General Winfield Scott on his way to Wisconsin with his troops who were to take part in the Black Hawk War suffered many losses among his men from cholera.

Simple measures that we might well keep in mind would have saved lives. Mosquito nets would have reduced the incidence of malaria; boiling of the water and burying of waste material would have prevented the cholera. As later shown in London by John Snow, an anesthetist, cholera disappeared there when the handle was removed from the Broad Street pump.

Malaria and cholera are still problems in the world in some areas but we in the United States are not troubled over these diseases, for which let us be thankful.

Water

WE READ in *Science News Letter* (April 23) that an evaporation system will produce drinking water from sea water at the rate of one million gallons a day. That was accomplished in Freeport, Texas. A similar plant ten times the size of the one at Freeport could produce drinking water much more economically.

This nation faces a serious situation which in time may become critical. The growing communities require more and more water. Modern sanitation, swimming pools, garbage disposals in the homes, modern laundry equipment, and dishwashers are increasing the demand for water.

We might speak of conservation but to the American, with plenty of everything, that subject in conversation is not very popular and usually falls on deaf ears. Who thinks of conserving when there is abundance? It is just not the human way and the American is no different in this regard than those of other nations.

Pollution of streams and lakes does nothing to help this water problem. With increased urbanization and the industry that goes with it there is a great need to see that pollution is controlled. All noxious materials should be removed from the waste water before it is discharged into the streams.

Communities must be thinking in terms of water storage as well as tapping sources of supply. They may have to think also in terms of re-use of the water—a "water cycle" something like the nitrogen cycle.

For those near the ocean the tapping of that inexhaustible supply would be feasible, except, of course, how do we extract the H_2O without the minerals—that is, economically. This, too, is one of our great and very important projects. It is a project that many of the nations of the world should be working on for there are many areas that could supply food if water were available. And if food and water could be supplied then there would be more areas for this ever increasing number of human beings on this earth.

Yes, the need for potable water is a great one and will require our attention for many years to come.

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Around the World

(Ser. III, No. 22)

By
CLAUDIUS F. MAYER, M.D.

VICTORIA is the capital and the only town of the Seychelles, a group of 92 islands (40 of them inhabited) in the Indian Ocean situated several hundred miles N.E. from Madagascar, and about 1000 miles from the coast of Africa. Their combined area is about 400 sq. Km; the population numbered 40,000 in 1956. The climate is damp and under the influence of the trade winds. Temperatures vary between 68°F and 88°F. The *Seychelles islands* were originally a French possession, and most of the inhabitants are descendents of former slaves. Commerce and trade are in the hands of Indian and Chinese merchants. On the side of the "big planters" and a small group of middle class people, most of the population is "poor laborer." Except for the capital, mostly everywhere else the people are living in independent houses, getting their income from the growing of coconut palms, production of copra, of cinnamon oil, quills, vanilla. Their staple foods are rice and fish.

In the SEYCHELLES such *diseases* as malaria, leishmaniasis, yellow fever, sleeping sickness, yaws and bilharziasis are unknown. In 1957, 50 lepers and 100 tuberculotics were recorded among the inhabitants. Epidemics of whooping cough, diphtheria, measles, chicken-pox, and influenza may occur. Once, the venereal diseases were of major concern. The chief health problems nowadays are the various intestinal worms and protozoal infestations (amebiasis, giardiasis, balantidiasis).

In 1956-1957 the World Health Organization undertook a *health survey of the Seychelles;* the findings were recently published. Here are some of its findings. More than 50% of the population are less than 20 years old. Racially, 60% are African, 20% European, about 4% Indian, 2% Chinese, and the rest an ill-defined mixture. The pregnancy rate was 46 per 1000. The neonatal and infant mortality rates were high; abortions and stillbirths are also very frequent. Nutritionally, half of the population is well-fed, half is under-fed. More than 27% showed *signs of malnutrition,* but the nutritional disorder seemed to be caused mostly by intestinal parasites. It was noticed that the inhabitants of West Mahé, where the living conditions were the worst and the malnutrition and intestinal parasites showed the highest rate, had better teeth than the other islanders. With the exception of about 5% of the people, the rest have been *living under bad conditions,* with very small living space per person in the houses. Only 12.5% of the population had for themselves as much as 4.5 sq. m. of living space; the majority had less than 2.3 sq. m. The condition of the latrines was mostly bad. No wonder that 93% of the examined stools contained parasites. The soil samples taken near the houses showed that almost 25% of the inhabitants were living in areas where the soil was contaminated with *intestinal parasites* (due to the wide-spread use of chamber-pots which, though emptied into the latrines, are washed out near the house). The 5-9-year age group was mostly afflicted with diarrhea and asthma. Heart diseases increased with age. Pulmonary diseases had a peak in the 5-9-year age group, and another in the old age group. The frequency of *degenerative eye diseases* (pinguecula and pterygium) was rather high in young persons.

As a contrast to the Seychelles, let us look at *Greenland* which has a still smaller population yet it shows the marvels of modern organization of health affairs. Since 1953, Greenland has been an integral part of the kingdom of Denmark. Nevertheless, owing to its singular conditions, this vast area must

be still provided by special legislation which takes into account the customs and usages of the population. Formerly, the hunting of seals was the most important income-producing occupation of the inhabitants. But, with the rising of the temperature of the sea-water during the last 30-40 years, the seals became scanty, and the Esquimoes had to look for something else to do for the security of their existence. The warmer sea-water increased the fish population around Greenland, and thus the *life of the native communities changed from seal-hunting to fishing.* This also brought with it a number of health problems which were not present before, and they demanded an urgent solution. By a law of 1950, the *Greenland Health Service* was set up. A number of new hospitals have been built, the old ones were remodeled and now the 28,000 total population of Greenland has about 700 hospital beds, 200 of them in the new tuberculosis sanatorium at Godthaab. The activity of the Health Service is also shown by the fact that the general mortality rate has been reduced in recent years. In 1950, the death rate in Greenland was 25.5 per thousand; in 1956, it was 14.6 per thousand. In 1951, the infant mortality rate was 130 per thousand, and in 1955 was reduced to 78 per thousand. The tuberculosis campaign has been especially energetic. BCG vaccination has been carried through. An x-ray boat, the MISSIGSSUT, a gift of the Danish Majesties, visited all the stations along the west coast of Greenland, and detected tuberculosis cases at an early stage so that patients could get immediate medical treatment.

This way tuberculosis *mortality was reduced* from a 43% rate in 1950, to 17% in 1955 (the figures refer to the total numbers of death in Greenland). In the government's health work various private agencies have also participated, including the Danish Red Cross which has supported private clinics for tuberculous and scrofulous children. In 1949 the *Danish Red Cross* sent out a survey committee to find out what the greatest need was in Greenland. The doctor of the survey reported that orphans' homes were mostly needed, and health education was urgent. Accordingly, such homes were erected, the first of which opened at Godthaab in 1952, and the second at Egedesminde in 1955, while the third was inaugurated in 1958 at Julianehaab. The homes are under the direction of a Danish nurse, but the medical service is provided by the local medical officer. In way of health education, the Danish Red Cross published a First Aid book with Greenlandic text. Another textbook which the Red Cross published for Greenland is a book on child care and home nursing.

In the *reproduction of mammals,* some relation has been established between physiological function and environmental conditions, notably climate and weather. For instance, in the tropical *sheep country of Queensland,* each 100 ewes pregnant during the hot season produce 30 to 60 lambs of small size. Experiments showed that this dwarfing is the result of heat, and it has nothing to do with the food supply. Rats and rabbits will resorb about half of their fetuses when, without prior acclimatization, they are exposed to hot environments at 95°F. Such *climatic influences* were also postulated *for human reproduction.* Some time ago it was stated that conception in the U.S. is fluctuating with the seasons. Similar observations were made in Japan and in Switzerland. A *recent study in Queensland* showed that conceptions were reduced during summer (December-January) 22% in the inland districts, relative to the maximum *winter rate of conception.* In Tasmania, conception was high in the summer and low in the winter. In Queensland, a significantly higher birth-rate was found in hill towns of the southern subtropics than in similar towns to the north in the coastal tropics. It appears in general that Man achieves optimum fecundity in a temperate climate.

A study group of the WHO made known its findings in reference to the *epidemiology of lung cancer.* The sum total of the "evidence available today was most reasonably interpreted as indicating that cigarette smoking is a major causative factor in the in-

creasing incidence of human carcinoma of the lung." Air pollution could be also a factor, but in many countries its role appeared to be smaller than that of cigarette smoking. The range of the suspected specific occupational causes of lung cancer is also quite small. The genetic basis for susceptibility certainly exists but it does not invalidate the mass evidence regarding the influence of environmental agents. One striking observation has been made in reference to the wide range of mortality due to cancer in the different countries. Thus, it is surprising that the death rate for cancer of the lung among the males is about five times as great in Finland as in Norway. One wonders why this is so. But, regardless of the present imperfection of our knowledge about lung cancer, the existing knowledge is sufficiently well established to *justify prophylactic action* aimed at reducing exposure to known etiological factors.

Here is another note on the effects of tobacco. *Cancer of the mouth* and pharynx formed 17.42% of the malignant diseases *at Guntur,* as it was disclosed by the register of the Pathology Department of Guntur Medical College, India. This percentage is definitely higher than at any other part of the world. It is in direct relationship to the *smoking of "chuttas,"* the locally manufactured cigars. Women are especially devoted to the habit of chutta smoking, with the burning end inside their mouths. Among the non-smokers, carcinoma of the mouth and pharynx appears to be due to the *habit of chewing tobacco,* and/or betel with slaked lime, and spices, or betel with tobacco. Cancer of the mouth develops largely by the contact of the tobacco contained in the chewing quid.

In 1955, at the Eighth World Health Assembly in Mexico City, the *world malaria eradication campaign* was born. For the first time, the nations form a coalition to fight a single disease. The malaria eradication campaign has its staff offices and supreme command, with headquarters in Geneva, it has its intelligence service, its supply lines, and its means of transportation. During 1958, the expenses of this campaign amounted to over 108 million dollars. More than 16 million dollars were given into this fund by the International Cooperation Administration of our country. The rest was paid by WHO, the Pan American Health Organization, and by the individual governments. The money fed into the malaria campaign is well spent, as, for instance, the case of *Afghanistan* may show. In that country, about one million peasants lived under the constant shadow of malaria, and some of the most fertile lands could not be cultivated due to malaria. The total cost of antimalaria work from 1949 to 1959 did not exceed $750,000 whereas malaria was the cause of a yearly loss of earnings amounting to 20 million dollars. In *Ceylon,* the disappearance of malaria resulted in a saving of about 30 million dollars per year. In the *Philippines,* the antimalaria campaign has made possible many projects which previously were out of question.

Judging from the growing operating costs for *mental hospitals in Canada* and from the rate of yearly admissions, the Chief of the Mental Health Division of the Canadian Health Department concludes that *mental sickness is increasing in Canada.* Since 1946, the admission rates have grown 117%, although the medical profession at large is still slow in recognizing mental illness. They are unable to detect a masked depression behind the physical complaints of the family members who are entrusted to their care. Each Canadian province has developed its mental health services independently, though according to a central national pattern. Community outpatient wards and day and night services in "care" centers developed rapidly, in addition to the new psychiatric units in general hospitals. (Psychiatric units in general hospitals are not very enthusiastically looked upon by the experts of World Health Organizations, however.) *Saskatchewan* wishes to develop regional hospitals, with much outpatient care. *Ontario* promotes the regional arrangement of diagnostic treat-

ment centers in the larger cities. Admission will be on an informal basis, without the completion of commitment papers. Ontario believes that the mental hospital is not an institution for custodial care. People who have grown old in the mental institution and for whom no active treatment will serve any useful purpose are being removed from the hospital, and placed in a wing, or in cottages where they can live in homelike settings, without demanding the attention of highly trained specialists. Another step in the right direction was the introduction of a horizontal organization on the basis of separate medical services whose heads can make decisions, without the need of submitting everything to the head of a hierarchical organization as previously.

The *Park Prewett Hospital* is one of the larger mental hospitals in *England*. The experience of its physician-superintendent is, therefore, of great value to all of us. He (I. Atkin) recently raised the question: "Why should certain types of mental patients be admitted to a hospital at all?" One of the old erroneous ideas is that a hospital is a place for "rest." If a neurotic individual needs rest and quiet, he will hardly find it in mental hospitals which are hives of intense activity. Mental hospitals are not convalescent homes nor holiday centers. Generally, admission should be avoided when the essential trouble is in the patient's environment, advises the superintendent. A patient with marital disharmony, bad housing, loneliness, and financial and occupational difficulties may settle in the hospital and never wish to leave. He may be very unwilling to leave the weekly movies and dance parties and other desirable social and recreational facilities which the mental hospital offers but which may not be available to him, especially in rural areas. Many senile inhabitants of the mental hospitals would be also better off in old peoples' homes. Neither are the mental asylums the proper place for psychopathic personalities who would need special detention units where discipline could be enforced.

Talking about discipline, a peculiar *case of juvenile delinquency* was recently presented at the Royal Society of Medicine, London. It was the case of a normal, healthy boy who was well-behaved up to the age of 12 years. Then, he had some fever, and frontal headaches for a few days. Afterwards, he remained uncontrollable, and committed petty larceny. He was placed in a special institution, where he again showed an abnormal, irregular fever, great aggressiveness, visciousness, and some mental confusion. Neurological examination pointed to some space-occupying process in the right frontal region. There was a *large cerebral abscess* which contained beta hemolytic streptococci. The postoperative course was normal. Afterwards, the boy again became friendly, and likeable, without any further residue of a psychopathic behavior.

Among the congenital abnormalities, the lack of brain, or *anencephaly*, is of a rather infrequent occurrence. The more surprising is the observation of the county medical officer of *Northamptonshire, Scotland*, where during the last 15 years the anencephalic births *occurred in groups* in time and space. This grouping is shown by the fact that in the village of Loddington, with five births a year, the only two cases of anencephaly were born in the same year, in 1950. In Kettering, 5 out of 13 anencephalics were born in one year, in 1954. There were only two other anencephalics born in the county in that year. In Corby, 4 out of 8 anencephalics were born in one year, in 1957. It seems that there may be an association between *Asian influenza* in the mothers and the congenital anomaly in their babies. Some years ago the *British Medical Journal* advised parents who had an anencephalic child to restrict future conceptions to the winter months. The *planning of pregnancies* seems to be a rational measure for parents with history of abortions, stillbirths or abnormalities.

The *Fifteenth International Tuberculosis Congress* which was held last September in

Istanbul included eight symposia, and two seminars. The *symposia* were on: (1) chemoprophylaxis of tuberculosis; (2) the problem of atypical acid-fast bacilli; (3) indications for surgical treatment of pulmonary tuberculosis; (4) new anti-bacterial drugs; (5) relapse of pulmonary tuberculosis after treatment (medical and surgical); (6) health education in the light of the new methods of prevention and treatment of tuberculosis; (7) the role of the public health nurse and the social worker in tuberculosis control; and (8) new methods in the rehabilitation of the tuberculous. The *seminars* included acquired immunity in tuberculosis, and the role of BCG vaccination in the different countries of the world. It was generally agreed that BCG was not indicated in all countries, but that those economically underdeveloped and with known high tuberculosis incidence should benefit most. It was also found that the problem of the *atypical bacilli* is the *greatest in the U.S.A.* For the atypical pathogenic bacilli, Runyon's four groups were accepted: (1) photochromogens, (2) scotochromogens, (3) non-pigmenting Battey type, and (4) rapid growers. Clinicians were urged to be alert for the presence of such bacteria when tuberculosis is not responding to the usual treatment.

Studies at the *Calcutta School of Tropical Medicine* revealed that in a group of children in Pondicherry State who had been inoculated with *BCG vaccine* against tuberculosis the vaccine proved to be *protective also against leprosy.* Many of the children were so-called "family contacts," i.e., they were living with lepromatous persons in the same family. Yet, not a single case of leprosy developed during the 5-year period of observation in any of the vaccinated children.

At a fall session of the French Medical Academy, Bernard LAFAY brought up the idea of a *European organization for the coordination of medical research.* Medical science took great steps forward, especially after the Second World War. This resulted in a number of national organizations, national research councils, for the development of investigators, and for the general encouragement of medical research, financially and otherwise. Yet, nothing has been done so far for the coordination of these national efforts at a continental level. Why should not France take up its traditional role of leadership in this field?"—asks Dr. Lafay. After all, $^9/_{10}$ of the medical discoveries were made by French persons (?!). Someone remarked that a large number of such discoveries were made by persons who were not even of the medical profession. The project of an *International Academy of Medicine* may be excellent, but several countries, not even France itself, favor international organizations. And then, where would the financial support come from? From America?!

On 18 April, 1960, Professor Dr. Georg STICKER, emeritus teacher of medical history, quietly celebrated his *one-hundredth birthday* in Zell-am-Main. He wrote a now famous book on the history of epidemics, and once he was also awarded with the Goethe Medal for Arts and Sciences.

In 1959, the *Soviet Union* started a wholesale vaccination program against *poliomyelitis using live-virus vaccine* given by mouth. Many millions aready have been vaccinated. By the end of the current year, 88 million persons will have been vaccinated, including the whole population of the U.S.S.R. under the age of 20. The vaccine used by the Russians is made from virus strains supplied by Dr. Sabin, of Cincinnati. Similar vaccination was started in Poland and Czechoslovakia. The Soviet Government invited an American doctor from Yale School of Medicine to evaluate the safety and efficiency of the new vaccination. According to this evaluation, the results are impressive as far as received. But a little longer time is needed to give a valid judgment on how the new vaccine prevents polio epidemics.

The *Irkutsk Society of Orthopedists* held its meeting last November at Petropavlovsk, a thriving town near the tip of the *Kamchatka*

Peninsula. From the lectures we learned that in 1958 Eastern Siberia and the Far East of the U.S.S.R. had many *cases of poliomyelitis,* in spite of the ever widening network of sanatoria and health resorts for children in this huge area. There are more than 200 such sanatoria and health resorts now in Eastern Siberia, some of them located in Kamchatka itself. During 1955-1959, the number of polio cases was 98 in this peninsula. They were treated mainly in the infectious and neurological wards of the hospitals. Preventive vaccinations were also given in schools and at child welfare centers.—Some days of the Petropavlovsk meeting were devoted to the discussion of the *prevention of injuries in the fish industry* of Kamchatka. (NOTE: For the care of this type of injuries, the Soviet government opened a special department with 50 beds in the Kamchatka Area in 1958, and in the same year almost 150 operations were performed in this center.)

One of our Kentucky surgeons collected 100 *cases of coccygodynia* in his practice. He became quite an expert in "blitz-diagnozing" such cases by the manner of the attitude and posture of the sufferers. A patient of pain in his tail-bone sits down cautiously, then shifts his position from one side to another. He may wish rather to stand while his history is taken. Indeed, the pain is exacerbated by continued sitting and it is the most severe while rising from a sitting position, and it is aggravated by long motor rides. Not infrequently the pain is caused by spasm of the muscles around the outlet of the pelvis (levator ani, coccygeus, piriformis). In this Era of watching television programs for long hours, coccygodynia may be expected to become more frequent. Indeed, the doctor even coined a modern term for the old ailment. He calls it *"television bottom,"* and recommends intrarectal massage of the spastic muscles of the televiser whose muscle fibers are to be kneaded "in the same manner as a strop is stroked by a razor." . . . *Multa paucis!*

NOTES

Timely items of general interest are accepted for these columns. Deadline is 1st of month preceding month of issue.

Department of Defense

Ass't Secretary (Health & Medical)—HON. FRANK B. BERRY, M.D.

Deputy Ass't Sec'y—HON. EDW. H. CUSHING, M.D.

SELECTIVE SERVICE

The Department of Defense has requested the Selective Service System to provide 7000 men during August for assignment to the Army.

STRENGTH—ARMED FORCES

The total numerical strength of the Armed Forces on May 31, based on preliminary reports, was 2,465,500. This figure represents a decrease of 6,619 from April 30.

MEDICARE

Almost seventy percent of the admissions to hospitals under the Medicare Program, which was inaugurated in December 1956, were, in its third year, due to maternity cases. This program designed for the care of the dependents of members of the Armed Forces and Commissioned Personnel of the Public Health Service entails an annual expenditure of approximately $72 million.

The responsibility for the direction of the Program is that of the Surgeon General of the Army. The present Director of Medicare is Brigadier General Floyd L. Wergeland.

Army

Surgeon General—LT. GEN. LEONARD D. HEATON

Deputy Surg. Gen.—MAJ. GEN. THOMAS J. HARTFORD

NEW CHIEF, DENTAL CORPS

Major General Joseph L. Bernier, DC, whose appointment to that rank was confirmed by the Senate, recently assumed the duties of Chief of the Dental Corps of the Army, on August 1. He replaced Major General James W. Epperly, who retired.

General Bernier is the first Army dentist to be promoted to Major General from Colonel. He is the first certified oral pathologist in the Army Dental Corps, and is the only American military dental officer to hold the degree of Fellowship in Dental Surgery in the Royal College of Surgeons in England. He organized the American Academy of Oral Pathology in 1946, the membership of which is now more than 400. He also founded the American Board of Oral Pathology and is currently its president.

In 1959, he was named one of the "Twelve Outstanding Dentists in the History of American Dentistry" by the United States Information Agency and the National Library of Medicine. He has written extensively, is author of several textbooks, and his "Management of Oral Disease" is used as a standard work in 25 dental schools.

General Bernier, a native of Chicago, received his DDS from the University of Illinois in 1932, and his Master's Degree in Dental Pathology and Therapeutics from there in 1934.

He entered military service in the fall of

1934. During World War II he served in Europe. For a number of years he has been Chief of the Oral Pathology Branch, Armed Forces Institute of Pathology, which under his leadership has become an international center for the study of oral disease.

General Bernier is associated with Georgetown University and Jefferson Medical College.

RECEIVES HIS D.SC. DEGREE

Major General Isidor S. Ravdin, USAR, Retired, received the Honorary degree of Doctor of Science from Lehigh University, Bethlehem, Pa., in June.

Doctor Ravdin, a native of Indiana, received his B.S. degree from Indiana University in 1916, and his M.D. degree from the University of Pennsylvania School of Medicine in 1918. He was in active service in World War I and in World War II was Chief of the Surgical Service and Commanding Officer of the 20th General Hospital. He is at present Professor of Surgery and Vice President for Medical Affairs in the University of Pennsylvania.

GENERAL SHAMBORA RECEIVES HONOR

Major General William E. Shambora, Commanding General of Brooke Army Medical Center, was awarded the honorary degree of Doctor of Laws at the 1960 commencement of St. Mary's University in San Antonio's Municipal Auditorium.

Also awarded honorary degrees of Doctor of Laws were Louis J. Koucurek, San Antonio civic leader and Honorable Robert C. Hill, U. S. Ambassador to Mexico.

ASSIGNMENT TO SGO

Major Matthew D. Parrish, MC, has been named Assistant Chief Psychiatry and Neurology Consultant in the Professional Division, Office of the Surgeon General.

Major Parish has a unique background. He received an A.B. degree in English from the University of Virginia in 1939, and in 1941, entered the Air Corps, serving as navigator in the 404th Bomb Squadron, 11th Air Force, in Alaska and the Aleutians until 1943. For a little over a year (June 1942 to August 1943) the Japanese were occupying several islands at the tip of the Aleutian chain. Later Major Parrish was at the Ground School for B-29 bombers.

After his discharge from the military service he entered George Washington University and graduated from its medical school in 1950. He then entered the Army Medical Service where he has specialized in neurology and psychiatry.

BAMC NEWS

Top award in the Military Medical Section of exhibits at the American Medical Association meeting at Miami, Florida, went to the Surgical Research Unit's display of its modified exposure technique for the treatment of burns.

Lt. Colonel Martha E. Moseman, AMSC, has been assigned to Brooke General Hospital as Chief of the Food Service Division. She succeeds Lt. Colonel Katherine E. Manchester who has been assigned as Chief of the Dietitians Section, Office of the Surgeon General, Washington.

Captain Robert W. Parsons, MC, USA, of Moline, Illinois, was named as winner of the Skinner Medal which is awarded to the medical officer receiving the highest scholastic rating in the officers advanced course at the Army Medical Service School each June and December.

Captain Russell W. Bickley, DC, USA, of Port Clinton, Ohio, received the second award of the Fairbank Medal which is presented to the dental officer with the highest scholastic rating in the Officers Advanced Class at the Army Medical Service School each June and December.

Nurses recently retired from the Army with their last station being Brooke General Hospital are: Lt. Col. Gracie L. Chapman (Baton Rouge, La.), Majors Dorothy Fels (709 W. Rosewood St., San Antonio, Texas), Georgia Drakulich (El Paso, Texas), Lena Toole (Atlanta, Ga.), and

Irene Williams (244 Natalen St., San Antonio, Texas).

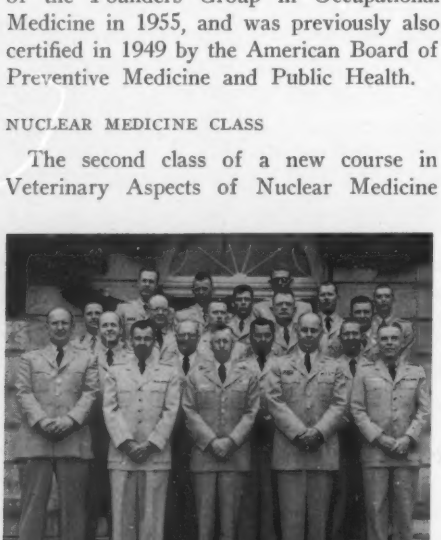
CONSULTANT IN PREVENTIVE MEDICINE

Colonel Edward J. Dehne, Chief of Preventive Medicine, Office of the Surgeon, Headquarters Second Army at Fort George G. Meade, Maryland, has been named as Consultant to The Surgeon General of the Army in the specialty fields of Preventive Medicine and Occupational Medicine.

Colonel Dehne was certified as a member of the Founders Group in Occupational Medicine in 1955, and was previously also certified in 1949 by the American Board of Preventive Medicine and Public Health.

NUCLEAR MEDICINE CLASS

The second class of a new course in Veterinary Aspects of Nuclear Medicine was held May 9-20 at the Walter Reed Army Institute of Research in Washington, D.C. This course provides training for veterinary officers in the areas of nuclear medicine where their professional skills will be required. Among the subjects discussed are radiobiology, radiochemistry, radiopathology, and laboratory examination of foods contaminated with radioactive substances.



U. S. Army Photo

(*L to R*) (*first row*)—Lt. Col. G. W. Vacura, USA, *Course Director;* Col. C. H. Snider, USA, *Ass't Course Director;* Col. M. B. Starnes, USA, Dir. of Research, Div. Vet. Med., WRAIR; Col. C. W. Gollehon, USA; Col. Wm. E. Bills, USAF.

(*Second row*)—Maj. W. R. Bilderback, USAF; Maj. W. A. Bridenstine, USA; Lt. Col. C. H. Muniz, USAF; Maj. R. L. Hanson, USAF.

(*Third row*)—Capt. A. P. Catsaounis, Greek Army; Lt. Col. J. B. Couch, USAF; Capt. R. F. Sis, USAF; Lt. Col. W. W. Fechner, USA; Lt. Col. W. G. Brooks, USA.

(*Fourth row*)—Lt. D. W. Mattson, USA; Lt. R. L. Cheney, USA; Lt. W. H. Niemann, USA; Lt. B. C. Tennant, USA; Capt. W. G. Wisecup, USAF; Lt. D. L. Houston, USA.

PG DENTAL COURSES AT WRAIR

The following Postgraduate Dental Professional Short Courses will be offered at the Walter Reed Army Institute of Research during the remainder of 1960 and the early part of 1961.

Prosthodontics (Nov. 28-Dec. 2, 1960); Oral Surgery (Jan. 9-13, 1961); Oral Diagnosis and Therapeutics (May 15-19, 1961); Preventive Dentistry (June 5-9, 1961).

Applications for the courses should be made through channels in the case of military personnel, and in the case of civilian dentists to The Director, Division of Dentistry, Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington 12, D.C.

NEW STATIONS

Major General Jack Schwartz, MC, who has been Commander of the Tripler General Hospital, and Brig. General A. L. Tynes, who has been Commander of Letterman General Hospital, will exchange positions.

Colonel Lucius G. Thomas, MC, who has been Post Surgeon of the Presidio of San Francisco, has been transferred to Headquarters Second Army, Fort Meade, Maryland.

Lt. Colonel Theodore Stalk, MC, formerly Commanding Officer of the Army Hospital, Yuma Test Station, Arizona, has become Post Surgeon of the Presidio of San Francisco.

EMERGENCY CARE COURSE FOR NON MEDICAL PERSONNEL

The Brooke Army Medical Center, realizing the great importance of teaching non medical personnel some of the fundamental

principles of care of casualties in an emergency, held its first course for those persons, in June.

The training course was requested by Lt. General Edward T. Williams, Fourth Army Commander. The 50 students who received training in this first course are expected to return to their units and teach these principles to others. If they in turn pass the instruction on to others the training of non medical personnel in the matter of casualty care will be greatly extended.

Teaching of care of casualties must become contagious and an evangelistic fervor along this line must be developed in the American people. There simply will not be enough medically trained persons to carry out the early treatment required for casualties in any disaster of a major proportion.

This problem will be forever with us and it is well that far sighted persons with authority to direct such training are now taking the initiative.

It will not be enough, however, just to take the course. Only by repetition can the principles of casualty care be firmly established.

MEMORIAL FUND

Scholarships from the Eleanor L. Mitchell Memorial Fund will be awarded annually to a college student who plans a hospital dietetics career.

This memorial fund has been established in memory of the late Lt. Colonel Eleanor L. Mitchell, AMSC, former chief of the Army's dietitians and among the first to be commissioned in 1943.

Contributions to the fund may be made to the American Dietetics Association, 620 North Michigan Avenue, Chicago 11, Illinois. Information regarding the scholarships can be obtained from the same office.

RETIRED RESERVE

The Department of the Army has announced that Reservists who on and after September 30, 1960, complete 20 years or more of active duty and are retired under Title II, Public Law 810, will be placed in the Retired Reserve.

EXHIBIT RECEIVES HONORABLE MENTION

The exhibit, "The Solitary Pulmonary Lesion," was submitted by Lt. Colonel Walton M. Edwards, MC, Chief, Medical Service, Landstuhl Army Hospital, Germany, and Captain Stephen P. Dittman, MSC, designer for the American Medical Association Meeting in Miami Beach, Fla. The exhibit received Honorable Mention.

This exhibit has been shown at a number of medical meetings in Europe and will remain in the United States for viewing this year.

Army Photo

COL. JAMES T. MCGIBONEY, MC, USA, Chief, Medical Plans and Operations, SGO (left), and CAPT. S. P. DITTMAN.

Navy

Surgeon General—REAR ADM. BARTHOLOMEW W. HOGAN

Deputy Surgeon General—REAR ADM. EDWARD C. KENNEY

BUMED ASSIGNMENTS

Commander John M. Page, CEC, USN, recently reported to the Bureau of Medicine and Surgery for duty in the Planning Division as CEC Technical Advisor.

Lieutenants James A. Hunt, MSC, USN, and David M. Wylie, MSC, USN, have been assigned for duty in the Physical Qualifications and Medical Records Division.

HONORARY MEMBERSHIP IN ASSOCIATION

Lt. Colonel Cleopatra D. Avayanou, Chief of the Nurse Corps of the Army of Greece, was presented with an Honorary Membership in the Association of Military Surgeons of the United States when she attended a function in her honor at the National Naval Medical Center, Bethesda, Maryland, June 7.

Captain Ruth A. Houghton, Director of the Nursing Division of the Bureau of Medicine and Surgery of the Department of the Navy, and Chairman of the Nurse Corps Section of the Association of Military Surgeons made the presentation of the certificate of Honorary Membership and the badge of the Association.

In a letter to the President of the Association Colonel Avayanou says:

Dear Admiral Kern:

Upon my departure from Washington, D.C., I would like to express my deep gratitude for the honor bestowed upon me by The Association of Military Surgeons of the United States by the award and presentation of the Honorary Certificate and the corresponding medal. It affords me much pleasure to accept this honor in behalf of the military nurses of Greece. My appreciation is also extended to Captain Ruth A. Houghton, Chief, Navy Nurse Corps, who is currently the Chairman of the Nursing Section of the Military Surgeons Association who very kindly informed me of the accomplishments of the Association.

I am very pleased to have been afforded the opportunity to visit some of the American Military facilities in the United States. I have received assistance which will be useful to me and my country.

Please accept my deep appreciation for your kindness.

Respectfully yours,
/s/ Cleopatra D. Avayanou
Lt. Colonel
Army of Greece

U. S. Navy Photo

LT. COL. AVAYANOU, NC, Greek Army (left) and CAPT. HOUGHTON, NC, USN

Air Force

Surgeon General—MAJ. GEN. OLIVER K. NIESS

Deputy Surg. Gen.—MAJ. GEN. JOHN K. CULLEN

SYMPOSIUM

A three day international symposium on the "Medical and Biological Aspects of Energies of Space" will be sponsored by the Air Force School of Aviation Medicine, Aerospace Medical Center, Brooks Air Force Base, Texas. Colonel Paul A. Campbell, of the Advanced Studies Group, is Chairman of the symposium.

Southwest Research Institute, San Antonio, Texas, is in charge of arrangements for the symposium which will be headquartered at the Hilton Hotel in San Antonio, October 24-26.

For further information write to Jack Harmon, Symposium Coordinator, Southwest Research Institute, Box 2296, San Antonio, Texas.

"EPI LAB"

The 3790th Epidemiological Laboratory at Lackland Air Force Base, Texas, has two complete medical laboratories in trailers that are ready to go anywhere in the world

on short notice. These ten-ton trailers can be loaded into a giant C-124 Globemaster and are ready to function on arrival at destination. The value of these mobile laboratories in epidemiological studies in remote areas where laboratory facilities are non existent can readily be appreciated.

The 3790th, called "Epi Lab" is commanded by Colonel Thaddeus J. Domanski.

The mobile laboratories have air conditioning units as well as heating units, and waste disposal systems which treat waste material before it is expelled from the unit. The units can be used anywhere in the world.

Air Force Photo

A giant C-124 Globemaster prepares to swallow the 20,804 lb. Mobile Epidemiological Laboratory, a field unit of the 3790th Epidemiological Lab., Lackland AFB, Tex.

Public Health Service

Surgeon General—LEROY E. BURNEY, M.D.
Deputy Surg. Gen.—JOHN D. PORTERFIELD, M.D.

LIVE POLIOVIRUS VACCINE

Since live poliovirus virus vaccine is not licensed for sale in the United States the statement of the Surgeon General of the Public Health Service, Dr. Leroy E. Burney, is to be noted at this time when the vaccine is being used so extensively in Russia and some other countries.

The statement issued June 9th is as follows:

"Public Health Service scientists have been attending the Second International Conference on Poliomyelitis which has been meeting here this week under the auspices of the World Health Organization. During the past year, our staff have been following very closely the live virus trials in various parts of the world. This week, as a matter of fact, Dr. David E. Price, who served as my personal representative at a series of polio meetings in Moscow in mid-May, has made public a report on the use of live virus in the USSR during the past year.

"I mention all of this activity to illustrate the very lively and hopeful interest the Service has in the development of a successful live virus vaccine against polio.

"So far, the Service's technical experts and its scientific advisers are not convinced that all of the technical problems have been fully resolved.

"Among them are the significance of the changes which have been noted in the virulence of strains isolated after successive human passages, the effectiveness of the vaccines, and firm dosage recommendations, which would include the best method of administering the three types of live vaccine.

"It is apparent from the reports coming out of the present conference that a tremendous amount of work has been carried out since the meeting a year ago. The material is voluminous and will require careful study and analysis. I have asked the Technical Advisory Committee on Poliomyelitis to undertake that analysis immediately to see whether or not the studies presented have provided adequate answers to the questions of changing virulence, potency and effectiveness.

"Meanwhile, the Division of Biologics Standards is working with interested manufacturers to develop the necessary production controls for a safe, standardized product.

"I want to emphasize very strongly that the Public Health Service and I, as Surgeon

General, have the responsibility for making sure that biological products are safe and effective. We take that responsibility very seriously. When the technical experts of the National Institutes of Health and their highly competent advisers are satisfied on these two points, it will be possible to license a live polio vaccine but not before. How soon that will be, I do not know.

"I should point out that, so far, only one manufacturer has applied for a license. This request was returned for additional information; and no applications are now pending.

"In the meantime we have in the Salk vaccine a proved and highly effective means for fighting polio. It has been administered to about 80 million Americans during the past five years, and, despite a high polio incidence in the summer of 1959, it has proved over 90 percent effective when the recommended course of injections is followed.

"Unquestionably, a vaccine which can be administered orally and is less expensive to produce would represent another major advance in the fight against polio throughout the world.

"We want to be very sure that it is entirely safe and fully effective. When these two principles are fully established by a qualified manufacturer, we will be happy to grant licenses for its production."

CHIEF, DIV. OF HOSPITALS

Dr. Myron D. Miller who has been Deputy Chief of the Division of Hospitals has been appointed by the Surgeon General to be Chief of that Division. A native of Ohio, he received his M.D. degree from the University of Louisville School of Medicine and later graduated from the University of Michigan School of Public Health. He has had a broad experience in hospital administration.

COMMENDATIONS

Pharmacist Director Thomas A. Foster, USPHS, who until his retirement from the Public Health Service on July 1, was on detail to the Office of Civil and Defense Mobilization, was commended by Dr. Leroy E. Burney, Surgeon General of the Public Health Service, and also received a Certificate of Appreciation from the Director of OCDM, A. Leo Hoegh.

Dr. Burney said, "I wish to personally acknowledge the excellent working relationships you have established between the Public Health Service and the medical supply producing and distributing industry including the associated professional and trade organizations."

Mr. Foster will, on August 15, receive the 1960 Harvey A.K. Whitney Award which is made by the American Society of Hospital Pharmacists in connection with the Michigan Society of Hospital Pharmacists. Presentation will be made at the annual meeting in connection with the American Pharmaceutical Association at the convention to be held in August in Washington, D.C. Mr. Foster is General Chairman for the local committee for the convention.

He is a Life Member of the Association of Military Surgeons of the United States and a member of its Executive Council. Mr. Foster has established an office in Washington and will be a Consultant in Medical Supply.

Senior Surgeon Dominick J. Lacovara, USPHS-R, Chief medical Officer and Chief, Psychiatric Service, Federal Correctional Institution, Lompoc, California, was commended by Major General David Wade, Vandenberg Air Force Base, for the excellent service he rendered as Consulting Psychiatrist to the Base.

CHIEF MO COAST GUARD

Dr. Kenneth R. Nelson has succeeded Dr. Richard B. Holt as Chief Medical Officer of the U. S. Coast Guard. Dr. Holt has retired.

Dr. Nelson, a graduate of the University of Minnesota Medical School, was commissioned in the Regular Corps of the Public Health Service, in 1929. He has spent approximately half of his professional career in hospital administration.

ASSIGNMENT

Lorena J. Murray, R.N., M.S., Nurse Director in the Public Health Service, has joined the staff of the Division of Nursing Resources as a Nurse Consultant with the Professional Nurse Traineeship Program.

For the past three years she has been an Instructor in Public Health Nursing at the University of Minnesota. She also established a school for nurse teachers in Bandung, Indonesia. Her broad experience includes service with the Henry Street Settlement in New York City, the American Red Cross, and the U. S. Army.

BIOLOGICS STANDARDS BUILDING DEDICATION

Dignitaries attended the dedication of the Biologics Standards building at the National Institutes of Health, Bethesda, Maryland, on June 30.

The dedication was presided over by Surgeon General Leroy E. Burney. King Bhumidol Adulyadej of Thailand was present. The Secretary of Health, Education, and Welfare Arthur S. Flemming and Dr. James A. Shannon, Director of the National Institutes of Health took part in the program. The principal address was given by the Director of Biologics Standards, Dr. Roderick Murray.

This Division which is now five years old is responsible for the safety, purity, and potency of all biological products within the jurisdiction of the Public Health Service.

MONKEY MALARIA TRANSMISSION

Science, official publication of the American Association for the Advancement of Science (June 17 issue) reports the transmission of malaria to man from monkeys by way of the mosquito. The significance of this finding is not yet fully understood but studies are being made at the National Institutes of Health, Bethesda, Maryland.

WATER POLLUTION CONFERENCE

The advisory committee for the National Conference on Water Pollution which is to be held in Washington, December 12-14, met recently and decided that there would be panel discussion groups on five aspects of water pollution: (1) the nature of the problem; (2) its impact on health, welfare, and the economy; (3) the growing competition for water; (4) the problem of keeping water clean; and (5) the need for additional research.

The chairman of the advisory committee meeting was Frank A. Butrico, Public Health Service engineer. The Surgeon General has named him executive secretary of the conference.

JOINS TULANE UNIVERSITY

Senior Assistant Surgeon Joseph L. Izenstark, USPHS-R, has discontinued his private practice of radiology in Los Angeles to become Assistant Professor of Radiology at Tulane University where he will be active in teaching and research.

FILM RELEASE

The following films are now available:

Techniques of Laboratory Diagnosis of Influenza (M-368), MP, 16 mm, b&w, sound, 17 min., 600 feet, cleared for television.

Biology and Control of Domestic Mosquitoes (M-357), MP, 16 mm, color, sound, 21 min., 782 feet, cleared for television.

Introduction to Tissue Culture Techniques (F-388), Filmstrip, 35 mm, color, sound, 51 frames, 8 minutes; cleared for television. This is for laboratory directors and advanced laboratory technicians.

The above films may be obtained on a short-term loan (in U.S. only) from the communicable Disease Center, PHS, Atlanta 22, Georgia.

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.

Deputy Chief Med. Dir.—H. MARTIN ENGLE, M.D.

STATISTICS

The number of veterans in civil life at the end of May 1960 was 22,539,000. At the end of May 1959 the number was 22,677,000. There is a gradual decrease in the number of veterans. This was noted beginning last fall.

The number of World War I veterans on May 1960 was 2,675,000 as compared to 2,787,000 for May 1959. The average daily patient load in hospitals is approximately 115,000. This, of course, has seasonal variations and the winter months show higher figures.

The outpatient load for veterans care is increasing. For example, in May there were 189,949 visits, and in May 1960 there were 193,678.

APPOINTMENT

Dr. Benjamin B. Wells has been appointed assistant chief medical director for research and education in medicine in the Veterans Administration. He succeeds Dr. John B. Barnwell who retired recently.

Dr. Wells, a former professor and dean of the University of Arkansas School of Medicine, has been director of medical education service since July 1958. During World War II he served with the Army Medical Corps as consultant in pathology to the 12th Hospital Center, and was clinical pathologist for the European Theater Laboratory.

PALLIDECTOMY

A surgical method for the relief of Parkinson's disease (paralysis agitans or shaking palsy) will be evaluated by seven Veterans Administration hospitals. Pallidectomy, destruction of certain sections of the brain by electrocautery or other methods, is a relatively new procedure. The method is not applicable to all cases. In fact, Dr. Lyndon E. Lee, Jr., coordinator of the project in the Veterans Administration Office in Washington has said that pallidectomy is expected to be acceptable for only a small number of the approximately 2000 veterans treated for Parkinson's disease each year.

The chairman of this study is Dr. Blaine Nashold of the Veterans Hospital in Durham, North Carolina.

TOTAL BODY COUNTER

The second total-body radiation counter for the Veterans Administration was recently installed in Los Angeles. The other one is in the VA hospital in Boston.

These counters are heavy steel walled chambers in which the person is placed for testing. The one in Los Angeles is $6 \times 6 \times 4$ and is made of five laminated 1-inch sheets of steel plus a $\frac{1}{16}$-inch lead lining. It is housed in a steel building which is insulated and air conditioned.

With this counter the amount of potassium in the body can be determined. Knowledge of body potassium content is of importance in diagnosis of many diseases, particularly those conditions involving the nerves, muscles, and kidneys.

Miscellaneous

LIVE POLIOVIRUS VACCINE

The Second International Conference on Live Poliovirus Vaccine was held in Washington, June 6-10. This Conference was sponsored by the Pan American Health Organization and the World Health Organization with the assistance of the Sister Elizabeth Kenny Foundation of Minneapolis. Representatives from many nations were present.

The various strains of the poliovirus were discussed and the effects of the administration of vaccine from these strains were reported.

The findings regarding neurovirulence for monkeys which was reported at the First Conference were confirmed. A number of reports confirmed the instability of many of the strains after passage through the human intestinal tract.

Because of the limited amount of information on viremia in man following the administration of the vaccine further investigation and standardization methods will have to be made.

A fairly large series of new fields trials involving the use of the three different groups of attenuated poliovirus strains was reported by 24 groups of workers from 13 countries. In almost all trials including the massive experience in the USSR the opinion was universal that untoward reactions were either absent or insignificant and the so-called major illness of poliomyelitis had not either directly or indirectly been induced by infection with attenuated poliovirus used as a vaccine.

The studies showed that the oral vaccine can be given to the newborn and premature babies and older children without any ill effects. While pregnant women can be given the vaccine with safety not enough is yet known about the effects on the fetus; consequently further study must be made. Also adults who are triply negative to all three types of poliovirus, those receiving steroids, and those undergoing surgery will have to be studied further as the number of cases is too small to evaluate even though those to whom the oral vaccine has been given have shown no side effects.

If poliomyelitis virus can be eradicated in the gastro-intestinal tract by the use of the live attenuated virus (oral vaccine), a situation not possible with the inactivated virus (present vaccine), there is a great hope that the disease can be reduced to the present status of smallpox and diptheria. This is something to look forward to in the future.

No license has been issued yet in the United States for the manufacture of oral polio vaccine. However, the Salk vaccine is in ample supply and since this is licensed that vaccine should be used widely in our efforts to control poliomyelitis.

REVIEW COMMITTEE FOR F & D ADM.

Dr. C. Phillip Miller, Professor of Medicine, University of Chicago, has been appointed as chairman of a committee with seven members: Dr. J. H. Dingle, Dr. Maxwell Finland, Dr. C. M. MacLeod, Dr. K. F. Meyer, Dr. J. R. Paul, Dr. C. F. Schmidt, and Dr. Wesley Spink.

The committee will review the policies, procedures and decisions of the Division of Antibiotics and the New Drug Division of the Bureau of Medicine, Food and Drug Administration.

OCDM ANNUAL REPORT

The Annual Report of the Office of Civil and Defense Mobilization for the Fiscal Year 1959 is now available from the Superintendent of Documents, U.S. Government Printing Office, at 30¢ a copy.

This report which is very informative deserves the study of those having community civil defense responsibility.

INTERNATIONAL NURSING HOME CENTER

Plans are being made for the construction of an International Nursing Home Education, Research, and Service Center in Washington, D.C.

This Center will include a school to train nursing home administrators and personnel, a model nursing home, an extensive library on the care of the aged, a display of nursing home equipment, and research facilities.

Senator John J. Sparkman (D. Ala.), Senate Housing Subcommittee chairman, is urging legislation to provide more and better nursing homes for our nation. The Mutual Benefit Health and Accident Association of Omaha has contributed $80,000 for the development of the Center in Washington.

With the constantly increasing numbers of persons over the age of 65 in the United States, more and more problems are arising in their care. Increased facilities and more trained personnel must be provided. It is not enough to have numbers of employes but the employes must be trained. For such reasons the Center is being planned with a target date for completion in mid-1961.

The American Nursing Home Association headquarters is at 1346 Connecticut Avenue, N.W., Washington 6, D.C.

PROJECT HOPE

The S.S. *Hope*, 230-bed hospital ship will soon be headed for Indonesia with its staff of 15 physicians, 25 nurses and 30 auxiliary medical personnel. During the year that it

will be in the Far East other physicians will join the ship on a rotating basis.

Dr. Mark S. Beaubien of Birmingham, Illinois, vice-president for medical operations for Project Hope, has left for Djakarta, Indonesia, to work with the Ministry of Health of that country in developing a medical training program and an itinerary for the ship.

Dr. William B. Walsh, a Washington, D.C., physician and president of the project, has announced that this non-government program depends on the goodwill of the American public, industry, business and labor for the $3.5 million needed to operate the ship for a year. Those wishing to aid in this program may send their contributions to Project Hope, P.O. Box 9808, Washington, D.C. We would thus be aiding nations by sharing our country's modern medical knowledge with them.

MEDICO PROGRAM

Dr. Thomas Dooley's MEDICO, an international medical program, is constantly receiving support in the way of supplies and personnel. The program has set up 17 medical service installations in 12 countries in the Far East. Twenty American doctors, nurses, and medical aides will soon leave for these MEDICO posts.

Dr. Dooley has described the pharmaceutical industry's response to the program as "fantastic."

SOCIAL SECURITY HEADQUARTERS

The growing Agency of Social Security just recently moved into its $27½ million building at Woodlawn, a suburb of Baltimore, Maryland. Dedication was on July 1.

The building is equipped with all kinds of electrically operated machines to keep the records of over 130 million Americans.

In its 25th year the system is paying monthly benefits to more than 14 million men, women, and children at the rate of $10.9 billion annually.

REPORTS AVAILABLE

The following reports are available from the U.S. Department of Commerce, OTS, Washington 25, D.C.:

Radioactive Fallout: A Bibliography of Selected U.S. Atomic Energy Commission Reports (TID-3087), 74 pp., $2.25.

Radiation Protection Standards: A Literature Search (TID-3551), 28 pp., 75¢.

Shipping and Storage of Radioactive Materials (TID-3552), 20 pp., 75¢.

MANUAL AVAILABLE

The Manual of Sterilization, Disinfection and Related Surgical Techniques will be of particular interest to personnel of surgical services. In this 131-page book are the answers to many of the problems of planning, arrangement, supply, and sterilization. Copies of the manual are free. Write to The American Sterilizer Company, Erie, Pa.

BIOLOGICAL STAINS BOOKLET

A new technical reference booklet dealing with the uses of Biological Stains and listing their principal uses is available free of charge from Allied Chemical's National Aniline Division, 40 Rector Street, New York 6, N.Y.

REUNIONS

The 15th Evacuation Hospital Association will hold its 1960 reunion at the Hotel Traymore, Atlantic City, N.J., October 21-23. The Corresponding Official is Andrew C. Baumerich, 51 Mountain Avenue, Hawthorne, N.J.

The 216th General Hospital Association will hold its annual reunion in Boston, September 3-5. Those interested please correspond with Andrew J. Menzia, 79 Middle St., Lowell, Mass.

PRIZE SCIENTIFIC PAPER AWARD

The Southeastern Surgical Congress has announced The Prize Scientific Paper Award Contest which is open to residents of approved hospitals in the Southeastern states for the best scientific papers. The prize for the first prize winner is an all-expense paid trip to the meeting at Miami Beach, Florida, March 6-9, 1961, plus a cash award.

Papers are due in before December 1,

1960 at 340 Boulevard NE, Atlanta 12, Georgia.

FELLOWSHIPS AVAILABLE

The American Thoracic Society, Medical Section of the National Tuberculosis Association, is offering two fellowships and one traineeship as follows:

Edward Livingston Trudeau Fellowship: for specially qualified candidates with M.D. degree who have been assured teaching or research appointment.

Research Fellowships: For M.D.'s; Ph.D.'s; or Sc.D's desiring further training as scientific investigators.

Teaching Traineeships: Second or third year residents in Internal Medicine or Thoracic Surgery who are interested in teaching as a career.

Applications must be submitted by November 1 to: Director of Medical Education, American Thoracic Society, 1790 Broadway, New York 19, N.Y.

REHABILITATION CONGRESS

The Eighth World Congress of the International Society for the Welfare of Cripples will meet at the Waldorf-Astoria Hotel in New York, August 28-September 2. The theme is "Rehabilitation and World Peace." English, Spanish, French, and German will be the official languages.

NUTRITION CONGRESS MEETING

The Fifth International Congress on Nutrition will be held in Washington, D.C., September 1-7. This is the first time that such a Congress has been held in the United States. It is anticipated that 2500 nutritionists representing almost every country in the world will participate in this Congress.

MEETING

The 46th Annual Clinical Congress of the American College of Surgeons will be held in San Francisco, California, October 10 through 14. Nine postgraduate courses will be offered, headed by surgeon-teachers distinguished in their respective fields. The headquarters for the meeting will be at the Civic Auditorium, with some of the sessions to be held at nearby hotels.

Also announced is the 47th Annual Clinical Congress which will be held in Chicago, October 2 through 6, 1961.

SURGERY OF ENDOCRINE ORGANS

A three-day Symposium on the Surgery of the Endocrine Organs in which many distinguished authorities in that field will participate will be held at New York University Medical Center, November 17 to 19.

Further details may be obtained from the Office of the Associate Dean, New York University Post-Graduate Medical School, 550 First Avenue, New York 16, N.Y.

DESCENDENTS OF CIVIL WAR

Dr. Karl Rothschild, Plainfield, N.J., 747 W. Seventh St., is preparing a list of physicians who are descendents of Civil War veterans of the Union and Confederate armies. Those interested should contact him at that address.

PEYOTE

Do you know what "peyote" is? We must confess that we didn't. Then we got out a few books and found that it is a drug obtained from Mexican cactus, *Anhalonium;* used by natives to produce a state of intoxication marked by feelings of ecstacy (Dorland). Also listed as "peyotl" and "mescal."

Well, anyway some of the beatnik joints are using it. The Food and Drug Administration recently confiscated a supply of peyote in New York City. It is said that the drug is habit forming.

GRANDEUR OF NATURE

Each of us has need to escape occasionally from the noisy world which surrounds us and find refreshment in the grandeur of nature. Yet, year after year, our scenic treasures are being plundered by what we call "advancing civilization." If we are not careful, we shall leave our children a legacy of billion-dollar roads leading nowhere except to other congested places like those they left behind.—General Omar N. Bradley, *Recreation.*

ON DRIVING

Selfridge Air Force Base has this sign posted at the gate: "Notice! You are now entering a very dangerous area—The Public Highways. Good Luck!"

SPACE AGE

Modern missiles may have upwards of 2500 test check points and 5 million circuit combinations. Thus only one error in one million still results in five bad connections. —*Society of Automotive Engineers Jnl.*

TELEVISION

In Falls Church, Va., PTA members kept eyes fixed on TV programs through the hours children would be viewing them. They observed 185 programs for 114½ hours; saw 281 assaults, 117 killings, 19 robberies, 16 kidnappings, 10 murder conspiracies, 3 arsons, 3 extortions, 3 jailbreaks, 1 lynching, 1 bombing, and 1 suicide.—*Education, USA.*

KORAN WISDOM

"Let not thy hand be tied up to thy neck; neither open it with an unbounded expansion, lest thou become worthy of reprehension, and be reduced to poverty."—Chap. 17.

New Members

Capt. Arthur D. Graham, MC, USA
1st Lt. Marian V. Strzelec, AMSC, USA
Lt. (jg) Roland W. King, USNR, DC
LCdr. Edith Irene Casey, NC, USN
Major Anne E. Smith, ANC
LCdr. Annie Laurie Crawford, NC, USNR
Captain Bruce F. Holding, Sr., MC, USA
Capt. Edgar R. Palarea, USAF, MC
Capt. Jack M. Jacoby, MC, USN
Lt. James H. Salmon, MC, USNR
Gen. Raul Yazigi, Chilean Army
Helmuth Nathan, M.D.
Allen S. Cross, M.D.
Capt. John S. Shaver, MC, USN
Cdr. Charles Emmet Rogers, MC, USN
Lt. Col. Charles S. Lueth, USAF, MC
LCdr. Noma Virginia Foster, NC, USNR
Lt. Col. Charles S. Pennypacker, AUS, MC, Inac.
Capt. Reginald R. Rambo, MC, USN
Cdr. William Allen Snyder, MC, USN
Capt. William A. Spayde, MSC, USAR
Lt. Alexandre Solomon, MC, USN
Lt. Richard A. Leone, MC, USA
Capt. John D. Hallewell, USAF, MC
Lt. Robert E. Thompson, MC, USN
Lt. John G. Tully, Jr., MC, USN
Major Thomas G. Conte, DC, NJNG
LCdr. Audrey Ione Elmore, NC, USN
Capt. Robert C. McGee, MC, CAP
Lt. Rafael Jose Romay, M.D.
Capt. Edwin C. Grubbs, MC, USA
Capt. Norman L. Henderson, USAF, MC
Lt. Col. Frank L. Loskot, DC, NJNG
Capt. Dale B. Watkins, MC, USN
Major Colatine D. Laucks, USAF, NC
Gen. de Brig. Jose Luis Avellanal y Jimenez, Mexico
Lt. James E. Butler, DC, USN
Bernard B. Korostoff, M.D.
Capt. Karl R. Whitney, MC, USN
LCdr. Helen J. DeMariano, NC, USN
Lt. Col. Thomas E. Knox, DC, USAR
Lt. Margaret J. Paulsen, ANC, USA
Lt. Julio C. Rivera, MC, USNR
Lt. Hope H. McIntyre, NC, USN
LCdr. Lois E. Brown, NC, USN
John Gage Mahaney, M.D.
LCdr. Margaret H. Dilley, NC, USN
LCdr. Claudia M. Ferero, NC, USN
Ist Lt. Lowell D. Larson, MC, USA
Lt. Terrell B. Tanner, MC, USN
Lt. Lorrelle K. Brown, NC, USNR
James A. Inciardi, M.D.
Med. Dir. Leo Joseph Gehrig, USPHS
John L. Spencer, Ph.D.
LCdr. Agnes H. DesMarais, USPHS-R

Deaths

BROWN, Warwick T., Vice Admiral, Medical Corps, U. S. Navy, in Washington, D.C. Retired, died May 16, of a heart attack. His age was 70.

He is survived by two sons, Mills Brown of Williamsburg, Va., and Thomas M.

Brown, 1200 S. Courthouse Road, Arlington, Va.

CULPEPPER, William S., Colonel, Medical Corps, U. S. Army, Retired, died at Martin Army Hospital, Fort Benning, Georgia, April 9, at the age of 72.

Colonel Culpepper, a graduate of the University of Alabama School of Medicine (1911) entered the Army in 1917, and retired in October 1947. He is survived by: a son, Captain W. S. Culpepper, Jr., 800 Sunbury Drive, Alexandria, Va., and a daughter Mrs. Helen C. Pratt, 1030 Lincoln Court, San Jose, California.

DOUGALL, J. Park, Lieutenant Commander, Medical Corps, U. S. Naval Reserve, Retired, died March 31 at Los Angeles, California, at the age of 85.

Doctor Dougall was a graduate of the former California Eclectic Medical College of Los Angeles (1904). He served in the Medical Corps of the U. S. Navy in World War I and in 1919 returned to his practice in Los Angeles.

He is survived by his wife who resides at the family residence 338 S. Ardmore Ave., Los Angeles 5, Calif.

DUENNER, Robert D., Colonel, Medical Corps, U. S. Army, Retired, died June 12 at Walter Reed General Hospital, age 77. Death resulted from polycythemia vera.

Doctor Duenner, a native of Tennessee, graduated from George Washington University School of Medicine. He entered the Army in 1912. During World War I he was Commanding Officer of a 1000-bed hospital at Ravigny, France, and later commanded a hospital in Coblentz, Germany. He was post surgeon at Fort Sam Houston, Texas, from 1942 to his retirement in 1946.

He is survived by his wife who resides at 37 Old Oak Road, Newark, Delaware, one son and a daughter.

HYDE, Burton E., Colonel, Medical Corps, U. S. Army Reserve, died instantly in an automobile accident on May 18 at Troy, Ohio. His age was 60.

Doctor Hyde was a graduate of the University of Michigan School of Medicine, Ann Arbor, 1925. During World War II he served as Executive Officer at the New Orleans Port of Embarkation hospital and later in the Pacific area. After the war he returned to his private practice of medicine and surgery in Troy, Ohio.

RAMSDELL, Edwin G., Colonel, Medical Corps, USAR, Retired, died April 12, at White Plains, New York, at the age of 73.

Doctor Ramsdell graduated from the Columbia University College of Physicians and Surgeons in 1908. He specialized in surgery. In 1915 he joined the American Hospital in Neuilly, France, and when the United States became involved in World War I he joined the American Expeditionary Forces. He was in the St. Mihiel-Argonne Offensive. He was awarded the Chevalier de la Legion d'Honneur and the Croix de Guerre with Palm.

Doctor Ramsdell was a member of the Founders Group of the American Board of Surgery, a Fellow of the American College of Surgeons. In 1951 he received Columbia University's Lion Award for "outstanding service to his country, community, and to his university." He had been a member of the Association of Military Surgeons of the United States since 1920.

ROOD, Morris, Major, Medical Corps, U. S. Army, Reserve, died on April 22, at Northridge, California at the age of 52. Death was due to subarachnoid hemorrhage.

Doctor Rood practiced medicine in New York for 22 years and in California for 6 years. During World War II he was on duty at Camp Shanks, New York, the New York Port of Embarkation, and Stark General Hospital.

In addition to being a very busy physician, Doctor Rood was prominent in civic affairs. His wife, also a physician, was associated with him in the practice of medicine at 8833 Reseda Blvd., Northridge, Calif.

SILVIS, Richard S., Rear Admiral, Medical Corps, U. S. Navy, Retired, died at the U. S. Naval Hospital, Oakland, California, on May 5. Age was 53. He is survived by his widow, Mrs. Fay H. Silvis, 3327 Bodding Road, Castro Valley, Calif.

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